SIXTH EDITION

RISK COMMUNICATION

A HANDBOOK FOR COMMUNICATING ENVIRONMENTAL, SAFETY, AND HEALTH RISKS

REGINA E. LUNDGREN | ANDREA H. MCMAKIN

IEEE PRESS

WILEY

RISK COMMUNICATION

IEEE Press
445 Hoes Lane
Piscataway, NJ 08854

IEEE Press Editorial Board
Ekram Hossain, *Editor in Chief*

Giancarlo Fortino
David Alan Grier
Donald Heirman
Xiaoou Li
Andreas Molisch
Saeid Nahavandi
Ray Perez
Jeffrey Reed
Linda Shafer
Mohammad Shahidehpour
Sarah Spurgeon
Ahmet Murat Tekalp

RISK COMMUNICATION

A Handbook for Communicating Environmental, Safety, and Health Risks

SIXTH EDITION

Regina E. Lundgren
Andrea H. McMakin

IEEE PRESS

WILEY

Copyright © 2018 by The Institute of Electrical and Electronics Engineers, Inc., and
Regina E. Lundgren and Andrea H. McMakin. All rights reserved.

Published by John Wiley & Sons, Inc., Hoboken, New Jersey.
Published simultaneously in Canada.

No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, scanning, or otherwise, except as permitted under Section 107 or 108 of the 1976 United States Copyright Act, without either the prior written permission of the Publisher, or authorization through payment of the appropriate per-copy fee to the Copyright Clearance Center, Inc., 222 Rosewood Drive, Danvers, MA 01923, (978) 750-8400, fax (978) 750-4470, or on the web at www.copyright.com. Requests to the Publisher for permission should be addressed to the Permissions Department, John Wiley & Sons, Inc., 111 River Street, Hoboken, NJ 07030, (201) 748-6011, fax (201) 748-6008, or online at http://www.wiley.com/go/permission.

Limit of Liability/Disclaimer of Warranty: While the publisher and author have used their best efforts in preparing this book, they make no representations or warranties with respect to the accuracy or completeness of the contents of this book and specifically disclaim any implied warranties of merchantability or fitness for a particular purpose. No warranty may be created or extended by sales representatives or written sales materials. The advice and strategies contained herein may not be suitable for your situation. You should consult with a professional where appropriate. Neither the publisher nor author shall be liable for any loss of profit or any other commercial damages, including but not limited to special, incidental, consequential, or other damages.

For general information on our other products and services or for technical support, please contact our Customer Care Department within the United States at (800) 762-2974, outside the United States at (317) 572-3993 or fax (317) 572-4002.

Wiley also publishes its books in a variety of electronic formats. Some content that appears in print may not be available in electronic formats. For more information about Wiley products, visit our web site at www.wiley.com.

Library of Congress Cataloging-in-Publication Data is available.

ISBN: 978-1-119-45611-7

Cover design: Wiley
Cover image: @Lightspring/Shutterstock

Printed in the United States of America.

10 9 8 7 6 5 4 3 2 1

CONTENTS

List of Figures XVII

List of Tables XIX

Preface XXI

About the Authors XXIII

1 INTRODUCTION **1**

To Begin 2

The Risk Communication Process 6

Audiences, Situations, and Purposes 8

References 8

PART I UNDERSTANDING RISK COMMUNICATION

2 APPROACHES TO COMMUNICATING RISK **11**

Cross-Cutting Risk Communication Approaches 12

- Communication Process Approach 12
- National Research Council's Approach 13
- Hazard Plus Outrage Approach 14
- Social Amplification of Risk Approach 14
- Social Constructionist Approach 15
- CAUSE Approach 16
- Mental Noise Approach 17
- Social Network Contagion Approach 17
- Social Trust Approach 18
- Evolutionary Theory Approach 20

Care Communication Approaches 20

- Mental Models Approach 20
- Extended Parallel Process Model Approach 21
- Description-Experience Gap Approach 22

Risk Information Seeking and Processing Approach 22
Consensus Communication Approach 23
Crisis Communication Approaches 24
Original Crisis Communication Approach 24
Crisis and Emergency Communication Approach 25
Relational Dialectics Approach 25
Summary 26
References 26
Additional Resources 28

3 LAWS THAT MANDATE RISK COMMUNICATION 29
Comprehensive Environmental Response, Compensation, and Liability Act 30
Emergency Planning and Community Right-to-Know Act 31
Executive Order 12898, Environmental Justice in Minority Populations and Low-Income Populations 34
Executive Order 13045, Reduce Environmental Health and Safety Risks to Children 34
Food and Drug Administration Regulations on Prescription Drug Communication 35
National Environmental Policy Act 35
Natural Resource Damage Assessment 36
Occupational Safety and Health Act 37
Resource Conservation and Recovery Act 39
Risk Management Plan Rule 39
Privacy Rule 39
Other Government Inducements 40
International Standards, Guidance, and Agreements 40
North American Standards 41
Grants 42
Summary 42
References 42
Additional Resources 43

4 CONSTRAINTS TO EFFECTIVE RISK COMMUNICATION 45
Constraints on the Communicator 45
Organizational Constraints 46

Emotional Constraints 53
Constraints from the Audience 55
Cultural Alignment 55
Hostility and Outrage 56
Panic and Denial 58
Apathy 59
Mistrust of Risk Assessment 60
Disagreements on the Acceptable Magnitude of Risk 61
Lack of Faith in Science and Institutions 61
Learning Difficulties 62
Constraints for Both Communicator and Audience 63
Stigma 63
Stability of the Knowledge Base 64
Summary 65
References 65
Additional Resources 67

5 ETHICAL ISSUES 69
Social Ethics 70
The Sociopolitical Environment's Influence 70
The Use of the Risk Idiom 72
Fairness of the Risk 74
Consequences of Multiple Meanings 75
The Issue of Stigma 76
Organizational Ethics 77
Legitimacy of Representation 77
Designation of Primary Audience 79
Releasing Information 79
Attitude toward Compliance with Regulations 81
Personal Ethics 82
Using Persuasion 82
The Role of the Communicator 83
Liability and Professional Responsibility 83
Organizational Ethics or Personal Ethics? 84
Summary 85
References 85
Additional Resources 86

6 PRINCIPLES OF RISK COMMUNICATION 89
Principles of Process 90
  Know Your Communication Limits and Purpose 90
  Whenever Possible, Pretest Your Message 91
  Communicate Early, Often, and Fully 92
  Be the Expert 93
  Remember That Perception Is Reality 94
Principles of Presentation 95
  Know Your Audience 95
  Do Not Limit Yourself to One Form or One Method 95
  Simplify Language and Presentation, Not Content 96
  Be Objective, Not Subjective 96
  Communicate Honestly, Clearly, and Compassionately 96
  Listen and Deal with Specific Concerns 97
  Convey the Same Information to All Segments of Your Audience 97
  Deal with Uncertainty 98
  Address Misinformation 99
Principles for Comparing Risks 100
  Use Analogies, but Do Not Trivialize 101
  Use Ranges 102
  Compare with Standards 102
  Compare with Other Estimates of the Same Risk 102
  Compare Traits 103
  Do Not Compare Risks with Different Levels of Associated Outrage 103
  Explain Reductions in Magnitude 103
Summary 104
References 104
Additional Resources 105

PART II PLANNING THE RISK COMMUNICATION EFFORT

7 DETERMINE PURPOSE AND OBJECTIVES 109
Factors That Influence Purpose and Objectives 110
  Legal Issues 110
  Organizational Requirements 111
  The Risk Itself 111
  Audience Requirements 113

Reference 114
Additional Resources 115

8 ANALYZE YOUR AUDIENCE 117
Begin with Purpose and Objectives 118
Choose a Level of Analysis 119
Determine Key Audience Characteristics 122
Determine How to Find Audience Analysis Information 125
Incorporate Audience Analysis Information into Risk Communication Efforts 129
References 132
Additional Resources 133

9 DEVELOP YOUR MESSAGE 135
Common Pitfalls 136
Information People Want 139
Mental Models 141
Message Mapping and Message Development Templates 144
Health Risk Communication 144
Crisis Communication 147
References 150
Additional Resource 151

10 DETERMINE THE APPROPRIATE METHODS 153
Information Materials 153
Visual Representation of Risk 155
Face-to-Face Communication 156
The News Media 158
Stakeholder Participation 160
Technology-Assisted Communication 162
Social Media 163
Partnerships 164
Additional Resources 166

11 SET A SCHEDULE 167
Legal Requirements 167
Organizational Requirements 168

The Scientific Process 169
Ongoing Activities 169
Audience Needs 170
Reference 172

12 DEVELOP A COMMUNICATION PLAN 173
What to Include in a Communication Plan 174
Developing Risk Communication Strategies 177
  Storyboarding as a Planning Tool 178
  Communication Planning Using the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Approach 179
  Using an Audience Focus 180
  Strategic Planning for Risk Communication 182
References 183
Additional Resources 184

PART III PUTTING RISK COMMUNICATION INTO ACTION

13 INFORMATION MATERIALS 187
Constructing Information Materials 187
  Information to Be Included 188
  Organizing Content for Information Materials 191
  Language for Information Materials 191
  Narrative Style in Information Materials 194
Guidelines for Specific Types of Information Materials 195
  Newsletters 195
  Pamphlets, Booklets, and Fact Sheets 197
  Posters, Advertisements, and Displays 197
  Articles 199
  Technical Reports and Books 199
References 202
Additional Resources 202

14 VISUAL REPRESENTATIONS OF RISKS 203
Design Visuals for Specific Audiences and Uses 205
Match the Visual Portrayal to the Information to Be Conveyed 207
Pretest Graphics with Those Who Will Use Them 209

Using Visuals to Personalize Risk Information 213
Comparing Risks in Visual Formats 213
Static versus Interactive Visuals 216
Depicting Probability and Uncertainty 218
  Presenting Probability 218
  Presenting Uncertainty 223
  Probability plus Uncertainty 224
Warning Labels 227
Consider Using Action Levels 230
Ethical Portrayal of Risk Information 232
Using Visual Information in Group Decision Making 235
References 236
Additional Resources 239

15 FACE-TO-FACE COMMUNICATION 241
Constructing Face-to-Face Messages 242
  Choose the Appropriate Spokesperson 242
  Audience Acceptability 242
  Organizational Acceptability 244
  Finding the Right Person 244
  Give the Audience Something to Take Away 246
  Reinforce Your Message with Visual Aids 246
  Speak in the Language of the Audience 246
  Do Not Promise What You Cannot Deliver 247
Guidelines for Specific Types of Face-to-Face Communication 247
  Speaking Engagements 247
  Speakers Bureaus 249
  Tours and Demonstrations 250
  Video Presentations 251
  Audience Interviews 254
  Information Fairs 255
  Training 255
References 258
Additional Resource 258

16 NEWS MEDIA 259
The Roles of the News Media in Risk Communication 260
  News Media Contrasted with Other Stakeholders 261

Productive Interaction, Not Polarization 262
Understanding Cultural Differences 263
The News Media Are Event Focused 263
Certain Kinds of Risks Get More Coverage 264
Journalistic Independence and Deadlines Affect Content 264
The Need for Balance Invites Opposing Views 265
Information Is Condensed, Simplified, and Personalized 265
Guidelines for Interacting with the News Media 266
Develop Relationships with Local and Regional News Media Representatives 267
Know When to Approach Media Representatives or When They May Approach You 268
Prepare Messages and Materials Carefully 269
Know Where to Draw the Line 270
Put Your Message in Terms That the Reporter's Audience Can Understand 271
Put the Risk in Perspective 271
Respect the Reporter's Deadlines 272
Maintain Ethical Standards of Disclosure 273
Take Action When Inaccurate or Misleading Material Is Published or Aired 273
Evaluate News Media Coverage 274
Getting the Word Out 275
Distribution Services 275
Images, Video, and Audio 276
Connecting with Reporters on Social Media 277
Public Service Announcements 277
Telebriefings 278
Dealing with Fake News 279
References 281
Additional Resources 283

17 **STAKEHOLDER PARTICIPATION** **285**
Requirements for Stakeholder Participation 286
Organizational Requirements for Successful Stakeholder Participation 287
Stakeholder Requirements for Successful Participation 288

Guidelines for Specific Types of Stakeholder Participation Activities 290
The Formal Hearing 290
Group Interactions 292
Interactions Involving Risk Assessment 298
Interactions Involving Decision Making 299
Interactions Involving Risk Management 305
Evaluating Stakeholder Participation Based on Your Situation 307
References 311
Additional Resources 312

18 TECHNOLOGY-ASSISTED COMMUNICATION 315
Choosing Technology-Based Applications 316
Workplace Risk Communication 317
Computer-Based Training 317
Informing Employees about Risks 320
Web-Delivered and Stand-Alone Multimedia Programs 322
Online Multimedia Tools 322
Mobile Platforms 324
Web and Satellite Broadcasts 325
Traditional Electronic Forums 327
Interactive Multimedia Programs in Public Places 328
Technology in Care Communication 331
Technology in Consensus Communication 332
Websites 332
Tracking and Analyzing Comments and Responses 333
Facilitating Group Decision Making 334
Technology in Crisis Communication 336
Mobile Devices 336
Emergency Planning and Training Tools 339
References 343
Additional Resources 345

19 SOCIAL MEDIA 347
General Principles on Participating in Social Media to Communicate Risk 348
Determining Audiences for Social Media 349

Organizational Barriers to Social Media Adoption 350
Sharing Content via Social Media 354
Engaging with Stakeholders 355
Monitoring Changes in Perception via Social Media 356
Guidelines for Specific Types of Social Media 358
Social Networking Sites 359
Tweeting 360
Blogging and Podcasts 360
Video-, Image-, and File-Sharing Sites 361
Mapping 362
Evaluating Social Media Effectiveness 362
Dealing with Fake News 364
References 367
Additional Resources 369

20 PARTNERSHIPS 371
Categories of Partnerships 372
Task Forces and Advisory Groups 372
Crisis Response Partnerships 373
Legal Partnerships 373
Informal Partnerships 374
Sponsorships 374
General Principles for Working in Partnership 374
Working with Influencers 378
Identifying Influencers 379
Approaching Influencers 380
When You Are the Influencer 380
Evaluating and Ending Partnerships 381
References 383
Additional Resources 384

PART IV EVALUATING RISK COMMUNICATION EFFORTS

21 EVALUATION OF RISK COMMUNICATION EFFORTS 387
Why Evaluate Risk Communication Efforts? 387
The Meaning of Success 388
Types of Evaluations 391

Conducting the Evaluation 393
References 397
Additional Resources 398

PART V SPECIAL CASES IN RISK COMMUNICATION

22 EMERGENCY RISK COMMUNICATION 401
Understanding Emergency Risk Communication 402
  Emotions and Public Actions 402
  Credibility and Trust 407
Planning for the Unexpected 409
  Preparing Your Organization 410
  Check Your Attitudes at the Door 410
  You Want Me to Do What? Determining Staff Roles 411
  Ensuring Worker Communication 411
  Teaming with Other Organizations 414
  Exercises and Drills 415
  Working with Communities in Advance 418
  Determining Appropriate Communication Methods 420
  The Internet 420
  Social Media and Crowdsourcing 422
  Telecommunications 426
  Creative Alternatives 427
  Developing an Emergency Risk Communication Plan 429
  Additional Considerations in Emergency Risk Communication Planning 432
  Vulnerable Populations 433
Communicating During an Emergency 436
  Emergency Operation Centers 441
  Working with the Media in an Emergency 442
  Hotlines 446
Communicating After an Emergency 448
References 452
Additional Resources 456

23 INTERNATIONAL RISK COMMUNICATION 457
Recognize the Similarities 458
Account for Cultural Differences 459

Look for "Your" Risk in Other Countries 461
Plan for Cross-Country Communication 463
References 466
Additional Resources 468

24 PUBLIC HEALTH CAMPAIGNS 471
Understand Your Goals 472
Use Research to Design Campaigns 473
Use Multiple Methods to Reach People 474
  News Media 474
  Paid Placements and Independent Coverage 475
  Online Interventions and Social Media 476
  Other Methods 477
When Things Go Wrong 479
  Don't Blame or Vilify 479
  Counter Misinformation in Disease Outbreaks 480
Evaluate Success 481
References 485
Additional Resources 486

RESOURCES 489
General Risk Communication Resources 489
Environmental Risk Communication Resources 491
Safety Risk Communication Resources 491
Health Risk Communication Resources 492
Care Communication Resources 493
Consensus Communication Resources 493
Crisis Communication Resources 494

GLOSSARY 497

INDEX 501

LIST OF FIGURES

Figure 1.1. Examples of various types of risk communication. 4
Figure 3.1. Risk communication and public involvement activities associated with the Superfund cleanup process. 32
Figure 7.1. Primary purpose of risk communication related to newness and visibility of the risk. 112
Figure 9.1. Simplified expert model of the risk of infection from Lyme disease. 141
Figure 9.2. Expert model of the risks associated with HIV and AIDS. 142
Figure 10.1. Determining when to use stakeholder participation to communicate risk. 161
Figure 12.1. Outline of a risk communication plan. 175
Figure 12.2. Audience-centered technique for communication planning. 180
Figure 13.1. Information to include in written risk communication messages. 188
Figure 14.1. Illustration from a brochure on health risks of electric and magnetic fields. 206
Figure 14.2. Redesigned map of groundwater contamination on a federal site in 1994. 211
Figure 14.3. "Locator" state map used in conjunction with a more detailed map. 212
Figure 14.4. Time line of dates and events. 212
Figure 14.5. Chart used to help people determine their own radiation dose from various sources. 214
Figure 14.6. Addiction self-test. 215
Figure 14.7. Example "road map." 216
Figure 14.8 Range of possible radiation doses by category. 217
Figure 14.9. Human figures used in risk estimates. 219
Figure 14.10. Risk estimate in bar graph format. 220
Figure 14.11. Graphical displays of heart disease risk with and without hormone replacement therapy (HRT). 221
Figure 14.12. Added risk of side effects from medical treatment among 100 women. 222

Figure 14.13. A typical "cone-of-uncertainty" graphic used for hurricane warnings. 224
Figure 14.14. Additional graphic for hurricane warnings, showing probability by geographic area. 225
Figure 14.15. Example of a cumulative distribution function. 226
Figure 14.16. Examples of tobacco warning labels shown to be effective. 228
Figure 14.17. Warning symbol for respiratory sensitization, cancer, and other human health hazards. 229
Figure 14.18. Four versions of medication warning labels that were pretested with adolescents. 229
Figure 14.19. Medication warning label with text added to increase understanding. 230
Figure 14.20. Risk ladder for radon. 231
Figure 14.21. Deceptive use of data. 233
Figure 14.22. Relative versus absolute risks. 235
Figure 15.1. A film crew recording the stories of people impacted by the volcanic eruption of Nevado del Ruiz, Colombia. 253
Figure 18.1. Touch-screen program in a kiosk in Barrow, Alaska. 328
Figure 18.2. Mass casualty response scene in OLIVE, software for creating virtual worlds. 340
Figure 18.3. Virtual reality emergency room exercise. 340
Figure 18.4. Stanford Medical Center, real (a) and virtual (b), for emergency response training. 341
Figure 22.1a. Crowdsourcing with social media after a storm in the Philippines. 423
Figure 22.1b. Crowdsourcing with social media. 423
Figure 22.2a. Nepal crisis map. 425
Figure 22.2b. Volunteers keeping calm and carrying on. 425
Figure 22.3. Hurricane crisis map. 426

LIST OF TABLES

Table 4.1. Example organizational roles in risk communication 49
Table 4.2. Reasons the audience can be hostile 57
Table 5.1. Advantages and disadvantages of involving the public in risk assessment, management, and communication 72
Table 5.2. Stages when audience concerns and perceptions can be factored into the risk assessment or risk communication efforts 73
Table 5.3. Matching spokespersons to audience characteristics 78
Table 6.1. Acceptability of risk comparisons 101
Table 7.1. Risk communication purposes based on job relationships 113
Table 8.1. Key audience characteristics for the baseline audience analysis 123
Table 8.2. Key audience characteristics for the midline audience analysis 124
Table 8.3. Key audience characteristics for the comprehensive audience analysis 125
Table 8.4. Less-direct sources most useful for audience analysis for various types of risk communication 129
Table 8.5. Using audience analysis information to tailor risk messages 130
Table 9.1. Sample message map. Stakeholder: General Public. Question: How contagious is smallpox? 145
Table 14.1. Considerations for showing visuals in various media 206
Table 14.2. Options for portraying various aspects of risk visually 208
Table 14.3. Home radon risk for smokers and corresponding recommendations 217
Table 16.1. Questions to ask before an interview 269
Table 17.1. Advantages and disadvantages of stakeholder participation in risk communication 307
Table 17.2. Effective stakeholder participation for care, consensus, and crisis risk communication 308
Table 18.1. Communication objectives and corresponding technology-based applications 316
Table 19.1. How social media can be used for various types of risk communication 358

Table 20.1. Types, contributions, and expectations of potential partners 375
Table 21.1. Evaluation factors to consider for care, consensus, and crisis communication 391
Table 21.2. Advantages and disadvantages of using various evaluators 392
Table 22.1. Characteristics of emergency risk communication 403
Table 22.2. Typical staff roles in the emergency risk communication process 412
Table 22.3. Examples of stakeholders and their concerns in an emergency 431
Table 22.4. Communication actions in the first 48 hours of an emergency 438
Table 22.5. Phased message dissemination for hurricanes and floods 449
Table 24.1. Evaluation in public health campaigns 482

PREFACE

The first edition of this book came about because Regina Lundgren had always been fascinated with communication. She started writing novels in the third grade. When she was asked on her first day at the University of Washington what she hoped to do with her degree in scientific and technical communication, she replied, “I want to write environmental impact statements.” When Patricia Clark hired her to work at the Pacific Northwest National Laboratory to do just that, she was overjoyed.

Her fascination with communication led her to pursue an interest in risk communication. That in turn took her from leading the public relations function for an 800-person environmental research and development organization to developing her own consulting and training firm. Since then, she has been on a panel for the first workshop on risk communication for weapons of mass destruction events; developed the risk communication plan for the most sophisticated cancer cluster investigation in the nation’s history; crafted one of the first state-level risk communication plans for public health preparedness; and taught countless scientists, engineers, and communicators to share complex scientific and technical information among other projects for clients in government, industry, and academia.

Her earlier work at the Pacific Northwest National Laboratory put her in contact with Andrea McMakin, an accomplished risk communicator who had led environmental risk communication efforts that touched several states. Andrea’s master’s degree in communication, experience in training scientists and engineers to communicate, and firsthand knowledge of working with the news media as both writer and facilitator made her the perfect coauthor from the second edition of this book to this sixth edition.

The previous editions of this book have been used by practitioners, students, and teachers of risk communication across the United States and in at least 20 other countries. Readers’ suggestions and new experiences have helped us make the new edition even more useful in terms of content. We added new content on understanding lessons learned from some of the major disasters in the last two decades, developing robust partnerships, and countering false information as well as the growing body of evidence on how the brain processes risk information. We updated and expanded information on social media, technology-based applications, and public health campaigns.

This book was not written in a vacuum. We owe much of our own knowledge to our forebears in risk communication, including Vince Covello, Peter Sandman, Billie Jo Hance, Caron Chess, Baruch Fischhoff, Paul Slovic, Roger Kasperson, and Jim Creighton. Several other experts in science, management, and communication have inspired us by personal example: Pete Mellinger, Emmett Moore, Jack Robinson, Lori Ramonas, Bob Gray, Judith Bradbury, Kristi Branch, Geoff Harvey, Bill Hanf, Marilyn Quadrel, Dan Strom, Darby Stapp, Barb Wise, Randal Todd, and Dr. Sandy Rock.

Regina would like to thank Laurel Grove, who brilliantly edited the first edition, and Kristin Manke, who provided a professional index for the book. Most of all, Regina would like to thank her husband Larry and sons Edward and William, who always support her in all she does.

Andrea wishes to acknowledge the advice and review of several experts, including *L.A. Times* reporter David Shaw; science journalists Karen Adams, Mary Beckman, and Bill Cannon; radio reporter Charles Compton; media specialists Geoff Harvey, Greg Koller, Melissa O'Neil Perdue, Staci West, and Franny White; social media specialists Denice Bruce and Jodi Hamm; Portland State University professor Char Word; statistician Greg Piepel; graphic artist Mike Perkins; and information technology specialist Don Clark. She also thanks the many communication and public health researchers and information specialists who answered questions and corrected errors.

Regina and Andrea gratefully acknowledge peer review of the second edition by two luminaries in the risk communication field: Caron Chess, Director of Rutgers University's Center for Environmental Communication, and Susan Santos, founder and principal of the health and environmental management and risk communication consultancy FOCUS GROUP. Their insights and suggestions helped us think through several issues while staying true to the experiences of our readers.

We also thank Steve Welch for having the vision to continue publishing the book, Mary Hatcher for requesting the fifth and sixth editions, the other staff at Wiley-IEEE Press for their help and encouragement, and the reviewers from the IEEE who provided suggestions to improve this edition, especially Sean Tolnay, Director of the Naval Civil Engineer Corps Officers School Environmental Training Division; Dr. Tim Sly, Ryerson University; and Dr. Donna Kain, East Carolina University.

We welcome comments and suggestions from readers; please send them to us in care of our publisher, Wiley-IEEE Press, at pressbooks@ieee.org.

Regina E. Lundgren
Andrea H. McMakin

ABOUT THE AUTHORS

Regina E. Lundgren is an independent consultant in risk communication, public involvement, and science and strategic communication. For more than 30 years, she has specialized in communicating environmental, safety, and health risks to lay audiences. Her communication materials have won national and international awards. She serves her clients in government and industry in a variety of roles, from consultant to trainer to project manager. She developed the risk communication plan for the most sophisticated cancer cluster investigation in the nation's history and consulted on the first state-level system to communicate flood disaster risks to the public. She conducted research on the mental models approach to risk communication. She is a frequent speaker and trainer to industry groups, professional societies, and government organizations. She has a degree in scientific and technical communication from the University of Washington and a certificate in regulatory analysis from the Harvard School of Public Health. You can learn more at her website at http://www.rlriskcom.com.

Andrea H. McMakin is a communication specialist at the Pacific Northwest National Laboratory, a U.S. Department of Energy national laboratory in Richland, Washington. For more than 30 years, she has been involved with risk communication programs in national and global security, climate change, health and environmental impacts, worker chemical exposure, and risk perception research. Her work has been published and cited in technical journals, scientific and trade publications, and major regional newspapers. She holds a Master of Arts degree in communication from Washington State University.

1

INTRODUCTION

Risk communication encompasses many types of messages and processes. It is the poster warning food workers to handle food safely to prevent the spread of *Escherichia coli* bacteria. It is the emergency response worker rallying a community to evacuate in the middle of the rising flood. It is the community representatives sitting down with industry to discuss the siting and operation of a hazardous waste incinerator. Risk communication involves people in all walks of life—parents, children, legislative representatives, regulators, scientists, farmers, industrialists, factory workers, and writers. It is part of the science of risk assessment and the process of risk management.

Risk communication involves people in all walks of life—parents, children, legislative representatives, regulators, scientists, farmers, industrialists, factory workers, and writers. It is part of the science of risk assessment and the process of risk management.

Risk Communication: A Handbook for Communicating Environmental, Safety, and Health Risks, Sixth Edition. Regina E. Lundgren and Andrea H. McMakin.

© 2018 The Institute of Electrical and Electronics Engineers, Inc., and Regina E. Lundgren and Andrea H. McMakin. Published 2018 by John Wiley & Sons, Inc.

This book was written for those who communicate health, safety, and environmental risks, primarily the following:

- The communication professionals who prepare the messages, coach the speakers, and facilitate public involvement
- The scientists, engineers, and health care professionals who must communicate the results of risk assessments
- The organization representatives who must present a risk management decision
- Those new to the field of risk communication and anyone being asked to communicate risk for the first time

Because each of these readers may have different needs and questions concerning risk communication, we have divided the book into five parts. Each part or chapter within a part is relatively self-contained; a reader can choose to read some chapters and to skip others of less interest. Part I gives background information necessary to understand the basic theories and practices of risk communication and provides a basis for understanding information in the other parts. Part II tells how to plan a communication effort. Part III gives guidance on using various methods of communicating risk. Part IV discusses how to evaluate risk communication efforts, including how to measure success. Part V offers advice on special cases in risk communication: emergencies, public health campaigns, and international communication. A list of additional resources, a glossary, and an index are also provided. To emphasize key points, each chapter concludes with a summary section. Chapters that discuss how to apply risk communication (as opposed to those that deal with more theoretical aspects like principles and ethics) end with a checklist, which can be used to help plan and develop your risk communication efforts.

Much of our research and theory discussions, case studies, and recommendations draw from U.S. experiences, because that is our area of greatest familiarity. However, many of the risk communication principles we describe also apply to other countries. Readers will also find, sprinkled throughout the book, examples of country-specific risk communication research, successes, and pitfalls. Chapter 23, International Risk Communication, offers considerations for risk communicators outside of the United States and those who must address multi-country risks.

TO BEGIN

Many of the terms used in this book are defined in ways that differ slightly from usage in other branches of science or communication. A glossary is provided, but as a beginning, we want to explain exactly what we mean by risk communication and how it differs from other forms of technical communication.

Technical communication is the communication of scientific or technical information. Audiences can range from children in a sixth-grade science class, to workers learning a new procedure on a piece of equipment, to scientists reviewing the work of peers. The purpose of technical communication can be to inform, educate, or even occasionally persuade.

Risk communication is a subset of technical communication. As such, it has its own characteristics. At its most basic, it is the communication of some risk. (In this book, it is used to mean the communication of health, safety, or environmental risks.) The audience can be similar to those described for technical communication, but it can also be a wide cross section of the United States and beyond. For example, information to present the risk of not wearing seatbelts could have as an audience anyone who will ever ride in a car.

Sometimes, the risk being communicated is frightening to a particular segment of the audience. Other times, the audience is unaware of or even apathetic to the risk. In still other cases, the organization communicating the risk is not credible to a portion of the audience or the audience finds the way the risk is being managed to be unacceptable. The strong emotions, or the lack thereof, audiences associate with a risk can make it difficult to communicate.

The purpose of risk communication can also differ from that of technical communication. In dangerous situations, such as floods and tornadoes, risk communication may have to motivate its audience to action. In other situations, the purpose is more appropriately to inform or to encourage the building of consensus (more on this in Chapter 5). Another difference between risk communication and technical communication is that risk communication more often involves two-way communication, that is, the organization managing the risk and the audience carry on a dialogue. In technical communication, most efforts are designed to disseminate information, not to receive information back from the audience or to include the audience in the decision-making process. An example of two-way technical communication is scientists reviewing the work of peers.

> Risk communication comes in many forms. In this book, we generally divide risk communication along functional lines, distinguishing between care communication, crisis communication, and consensus communication.

Risk communication comes in many forms (see Figure 1.1). In this book, we generally divide risk communication along functional lines, distinguishing between care communication, consensus communication, and crisis communication, which are described in more detail later in this chapter. While these three forms have elements in common with other forms of technical communication, they always have circumstances that require different tactics, or ways of communicating, to effectively deliver their messages to and involve their respective audiences. For example, consensus communication involves much more audience

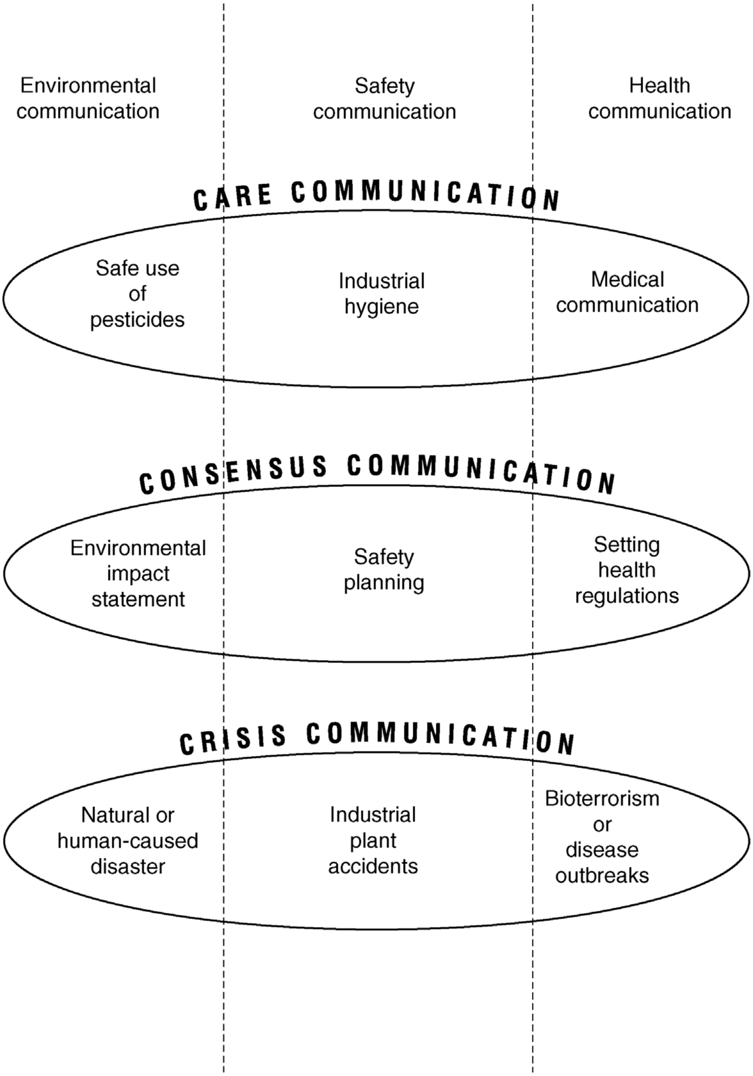

Environmental communication
Safety communication
Health communication
CARE COMMUNICATION
Safe use of pesticides
Industrial hygiene
Medical communication
CONSENSUS COMMUNICATION
Environmental impact statement
Safety planning
Setting health regulations
CRISIS COMMUNICATION
Natural or human-caused disaster
Industrial plant accidents
Bioterrorism or disease outbreaks

Figure 1.1. Examples of various types of risk communication.

interaction than do care or crisis communication. Risk communication can also be divided topically—for example, into environmental, safety, and health risk communication.

Care communication is communication about risks for which the danger and the way to manage it have already been well determined through scientific research that is accepted by most of the audience. Another distinguisher is that, generally, those charged with communicating have little return on investment other than the betterment of human lives. Think of the American Heart Association and local public health agencies.

Care communication is communication about risks for which the danger and the way to manage it have already been well determined through scientific research that is accepted by most of the audience.

Two subsets of care communication are health care communication (sometimes called health education or health marketing), which seeks to inform and advise the audience about health risks such as smoking or AIDS, and industrial risk communication, which involves informing workers about potential safety and health risks in the workplace. Industrial risk communication can be further divided into ongoing communication about industrial hygiene and individual worker notification, which informs workers of the findings of retrospective mortality studies, in which the mortality rates of a set of workers have been evaluated against standards. Examples of these are the longitudinal studies to determine the effects of beryllium on energy workers (that is, whether they had a higher rate of mortality compared to standards).

Consensus communication is risk communication to inform and encourage groups to work together to reach a decision about how the risk will be managed (prevented or mitigated). An example would be a citizen advisory panel and the owner/operator of the local landfill working together to determine how best to dispose of hazardous chemicals found at the landfill. Consensus communication of risk is also a subset of stakeholder participation, which encourages all those with an interest (stake) in how the risk is managed to be involved in consensus building. Often, the agency or organization with the greatest financial stake funds this process. (Stakeholder participation is also generally called public engagement, public involvement, public participation, stakeholder involvement, public consultation, and audience interaction.) Stakeholder involvement, however, can go far beyond risk communication, into the realms of conflict resolution. These realms encompass entire disciplines in themselves and, hence, are beyond the scope of this book.

Consensus communication is risk communication to inform and encourage groups to work together to reach a decision about how the risk will be managed (prevented or mitigated).

Crisis communication is risk communication in the face of extreme, sudden danger—an accident at an industrial plant, the impending break in an earthen dam, or the outbreak of a deadly disease. This type can include communication both during and after the emergency. (Communication during planning on how to deal with potential emergencies would be either care or consensus communication, depending on how much the audience is involved in the planning.)

THE RISK COMMUNICATION PROCESS

Crisis communication is risk communication in the face of extreme, sudden danger.

An overview of the risk communication process will also help explain the concepts presented elsewhere in this book. The process begins with a hazard, a potential or actual danger to the environment or human health or safety. Examples include an oil spill (environment), cigarette smoking (health), and a loose stair tread in an office building (safety). Usually by law but sometimes by commitment, some organization is responsible for managing the risks posed by this hazard, that is, preventing or mitigating any damage (decreasing the probability or lessening the consequences). In the case of a land-based oil spill, the U.S. Environmental Protection Agency, among other organizations, must develop regulations to prevent occurrence and oversee cleanup if preventive measures fail. The American Lung Association has a commitment to eradicate cigarette smoking. The Occupational Safety and Health Administration requires that organizations maintain safe work environments.

Risk management usually begins with a risk assessment. Just how dangerous is the risk? How much of a hazardous chemical has to spill into a river before the water's natural self-cleansing ability is overwhelmed? Can AIDS be spread by contact with infected health care practitioners? How does the way workers use a forklift affect their risks of being injured or of injuring another? Risk assessment is a scientific process that characterizes risk and assesses the probability of occurrence and outcomes. Based on probabilities, it usually tries to answer questions such as the following:

- Who, or what ecosystems, will be harmed?
- How many of them will be harmed?
- How will they be harmed and by how much?
- How long will the harm continue?

Sometimes the risk assessment has a benefit component attached (risk/benefit analysis). This kind of analysis seeks to determine whether any benefits attached to the risk would balance against the harm caused. For example, does the benefit of the potential advancement of science balance against the potential harm of experimenting with radioactive materials? This kind of analysis may or may not include factors other than the strictly scientific evaluation of the risk and benefit.

Information from the risk assessment is used by risk managers to decide what to do about the risk. Their decisions, and often the process by which they decide, are usually communicated to the people who would be or are affected by the risk or to those interested in the risk for other reasons (ethical issues, for example). Sometimes the risk managers try to encourage this audience to take action (care or crisis communication), sometimes they need to educate the audience about the risk so that the audience has the information needed to make a decision (care communication), and sometimes they need to discuss the risk with the audience so that a consensus on a course of action can be reached with all parties speaking the same language (consensus communication).

In the case of consensus communication, the decision about how risks are to be managed is made through stakeholder involvement. This type of management requires risk communication that seeks to

- Determine stakeholder perceptions of a variety of factors, including the risk, the organization in charge of managing the risk, and the process being used to reach the decision
- Inform, not persuade (except in the context of an agreed-upon negotiation)
- Balance the needs of competing stakeholders
- Assist in reaching a resolution that all parties can live with.

For example, the process of using an environmental impact statement to evaluate a set of alternative actions often begins with a series of stakeholder meetings to encourage individuals and groups to help define what should be evaluated (this part of the process is called scoping). Care communication and crisis communication also need to identify stakeholder perceptions and concerns; however, in these cases, the information is used to develop messages that will inform the audience and will encourage them to take some course of action. An example of this is the U.S. Environmental Protection Agency's program to communicate the dangers of radon in the home (for example, Weinstein and Sandman 1993).

> Where potential personal harm is concerned, the believability of information provided depends greatly on the degree of trust and confidence in the risk communicator. If the communicator is viewed as having a compromised mandate or a lack of competence, credence in information provided tends to be weakened accordingly. Or if the particular risk has been mismanaged or neglected in the past, skepticism and distrust may greet attempts to communicate risks.
> —Roger E. Kasperson (1986, p. 277).

At any point during the process, the organization that has been communicating may evaluate its risk communication effort to determine successes and failures. What should be changed next time? What was most effective for this audience, in this situation? Is there anything that can be generalized to apply to other situations and audiences?

AUDIENCES, SITUATIONS, AND PURPOSES

The ideas and techniques given in the rest of the book are tools. They are what we and other risk communicators have found to work for a given audience in a given situation with a given purpose. While a growing body of research lays out guidelines for effective risk communication, the differing dynamics among audiences, situations, and purposes makes finding the one "right solution" impossible, even if there is one right solution to find. Wherever possible, we have cited the work of others as confirmation of our own findings and those of other practitioners in the field. Citations for the research discussed in the text can be found at the end of each chapter. Other sources of information for risk communication can be found in the Resources section at the back of the book.

While a growing body of research lays out guidelines for effective risk communication, the differing dynamics among audiences, situations, and purposes makes finding the one "right solution" impossible, even if there is one right solution to find.

Many of the resources listed discuss such issues as credibility of the organization communicating or managing the risk, fairness of the risk in the audience's eyes, and trust among parties. These issues will be dealt with only as they relate to specific points in the rest of this book; however, they are important issues that heavily affect the ability to communicate risk effectively. Unfortunately, they are often outside the control of most of us who actually communicate risk. When we step in front of an audience, policies made by those far above us and sometimes years in the past have already either forged a bond of trust with the audience or broken it. Likewise, our credibility as risk communicators will depend on the credibility of other risk communicators who previously faced the same audience.

Although we cannot change the past, we can be aware of past mistakes or successes and make sure that our own efforts are trustworthy, credible, and fair, insofar as we have the authority to make them so. And we must champion the cause of trustworthy, credible, and fair risk management decisions in our own organizations, both because it is ethical and because it is the only way to ensure successful communication.

REFERENCES

Kasperson R. E. 1986. "Six Propositions on Public Participation and Their Relevance for Risk Communication." *Risk Analysis*, 6 (3): 275–281.

Weinstein N. D. and P. M. Sandman 1993. "Some Criteria for Evaluating Risk Messages." *Risk Analysis*, 13 (1): 103–114.

I

UNDERSTANDING RISK COMMUNICATION

To understand risk communication, you will need to understand the approaches to communicating risk, the laws that shape the way we communicate risk today, the constraints to effective risk communication, the ethical issues, and the basic principles of risk communication, which have evolved out of the approaches, laws, constraints, and ethics. Additional sources of information are listed in Resources at the back of the book.

> Learning about risk occurs not in isolated individuals but in a social dynamic, with multiple sources of information, channels of information flow, confirmatory and challenging mechanisms, and linkage with other social issues.
> —Roger E. Kasperson (1986, p. 131).

Risk Communication: A Handbook for Communicating Environmental, Safety, and Health Risks,
Sixth Edition. Regina E. Lundgren and Andrea H. McMakin.
© 2018 The Institute of Electrical and Electronics Engineers, Inc., and Regina E. Lundgren
and Andrea H. McMakin. Published 2018 by John Wiley & Sons, Inc.

2

APPROACHES TO COMMUNICATING RISK

There are many approaches to the process of risk communication and its components, including how messages are sent and received, how conflicts are managed, and how decisions are made. Some of these approaches are communication research methods in themselves, some grew out of research in fields other than communication, and still others are based on traditions across disciplines.

Why should those who are communicating risks learn about the various approaches? Each approach views risk communication from a slightly different perspective, just as different audiences view a risk from different perspectives. The more risk communication perspectives communicators understand, the more likely they will be able to choose approaches that meet the needs of their particular situation and audience, and the more likely that their risk communication efforts will succeed.

Are all approaches equally valid? Each approach was developed to illuminate a particular perspective on risk communication. Depending on how broad that perspective is, the approach may be applicable to a variety of situations and audiences. Some approaches, although still widely used in communicating risk, may be outdated given the situations and audiences that face communicators

---

Risk Communication: A Handbook for Communicating Environmental, Safety, and Health Risks,
Sixth Edition. Regina E. Lundgren and Andrea H. McMakin.
© 2018 The Institute of Electrical and Electronics Engineers, Inc., and Regina E. Lundgren
and Andrea H. McMakin. Published 2018 by John Wiley & Sons, Inc.

today. For example, the traditional communication method developed by Claude Shannon in 1948 is still used occasionally today to structure risk communication efforts even though more sophisticated models have been developed, which include the two-way communication so important to risk communication.

The following discussion of approaches to risk communication presents an overview of 16 of the most common approaches as well as implications for those who are communicating risk and how the approach might be used in various situations. Cross-cutting approaches that encompass care, consensus, and crisis communication are covered first, followed by approaches that focus on one of the types of risk communication.

> Are all approaches equally valid? Each approach was developed to illuminate a particular perspective on risk communication. Depending on how broad that perspective is, the approach may be applicable to a variety of situations and audiences.

CROSS-CUTTING RISK COMMUNICATION APPROACHES

The following approaches can be applied to care, consensus, and crisis communication.

Communication Process Approach

Risk communication is a form of communication that, like other forms, is represented by the traditional model of communication (Shannon 1948). That is, a source of communication generates a message that goes through a channel to a receiver. For example, a regulatory agency (the source) may decide that a chemical poses an unacceptable risk to the public (the message) and issue a press release (the channel) published as a story by the news media (another channel) that is read by members of the local community (the receivers). Various studies in risk communication have looked at individual components of this model (sources, messages, etc.) to see how changes in any component affect the others. For example, researchers at the Center for Mass Media Research at Marquette University found that the receiver relied more heavily on different channels for information based on personal emotions such as worry in the wake of a parasite outbreak in drinking water in Milwaukee (Griffin et al. 1994).

> Risk communication is a form of communication that, like other forms, is represented by the traditional model of communication. That is, there is a source of communication that generates a message that goes through a channel to a receiver.

The implications for risk communicators are that each of the model components needs to be considered when developing risk communication efforts. Will the source of the message be credible with the intended audience? Have the messages been developed in such a way as to be easily understood by the receivers? What channels (methods) are available that reach the intended audiences? What attitudes from the receiver will affect how the message is perceived? Can we plan for effective feedback to evaluate not only the risk communication process but the decision process as well? Additional information in Parts II–V will help risk communicators answer these types of questions for care, consensus, and crisis communications (see Chapter 1 for a description of these types).

National Research Council's Approach

In the 1980s, the U.S. National Research Council funded an extensive study in the effective communication of risk (NRC 1989). The multiagency panel of experts came to several conclusions. One was that risk communication can be defined as the "interactive process of exchange of information and opinions among individuals, groups, and institutions concerning a risk or potential risk to human health or the environment." The panel saw risk communication as a process by which scientific organizations both disseminate technical information and gather information about the opinions and concerns of nonscientific groups.

> Risk communication can be defined as the "interactive process of exchange of information and opinions among individuals, groups, and institutions concerning a risk or potential risk to human health or the environment."
> —NRC (1989)

The National Research Council later sponsored a second group of experts to look at how risk assessment (which they called characterization), management, and communication could be improved (NRC 1996). This group found that risk assessment should be directed toward informing decisions and solving problems, and that this consideration of the social context of the risk should start from the very beginning of the risk assessment and continue through management and communication. This group called for early and interactive involvement with those at risk.

The implication for those who communicate risk is that any form of successful risk communication must incorporate the "exchange of information and opinions" and the participation of the stakeholder groups from the beginning. How this exchange is accomplished will vary for each type of risk communication (care, consensus, or crisis). The audience is necessarily involved in exchanging information with those who are communicating and managing the risk in consensus communication. The exchange can be incorporated into care communication by, at the very least, soliciting audience feedback before and after risk information is distributed. The exchange may be the most difficult in crisis communication. In a crisis, by definition, there is almost never a time to bring together representatives of the audience to determine their needs and concerns. One way to solve this problem is to exchange information with the potential audience (those who may be affected by the crisis, for example, the community surrounding a chemical plant) as part of emergency planning efforts.

Hazard Plus Outrage Approach

> [Hazard and outrage] are connected by the fact that outrage is the principal determinant of perceived hazard. When people are upset, they tend to think they are endangered; when they're not upset, they tend to think they're not endangered.
> —Peter Sandman (2003, p. 26)

Noted risk communication expert Peter Sandman, in a number of articles, books, and videos, popularized the approach originally developed through research by Baruch Fischhoff and Paul Slovic that risk should be viewed as hazard plus outrage (Sandman 1987). That is, the audience's view of risk (as opposed to that of the experts assessing the risk) reflects not just the action (hazard) but, even more important, what emotions they feel about the action (their outrage). Think of the hazard part of the risk as the expert's assessment of the risk—the factors considered in the risk assessment, which may lack emotional aspects of the risk. Think of the outrage part of the risk as the nonexpert's assessment of the risk—the average person's outlook on the risk, which may lack some or all of the factors considered in the risk assessment. If both assessments are in agreement, that is, the expert and nonexpert agree that the risk is substantial (high hazard and high outrage) or insubstantial (low hazard and low outrage), then there is a lesser chance of controversy. If the two assessments do not agree (high hazard and low outrage or low hazard and high outrage), there is a greater chance of controversy.

The implication for those who are communicating risk (whether in care, consensus, or crisis communication) is that a presentation of technical facts will not necessarily give most audiences the information they want. Indeed, the audience will probably not even listen to those facts until their concerns and feelings have been addressed. You cannot ignore the outrage part of the risk and focus solely on the hazard. This does not mean that you should pretend to agree with the audience's concerns, which would be disastrous to building the levels of credibility needed to communicate risk. Instead it means that you must understand the audience's feelings and make sure that the information addressing those feelings is included in the risk message.

Social Amplification of Risk Approach

This approach grew from a social science perspective and was furthered by internationally known researchers Roger and Jean Kasperson (for example, Kasperson et al. 1988), as well as Paul Slovic and James Flynn. Slovic, Flynn, and others helped add the concept of stigma to the approach (for example, in Flynn et al. 2001).

The basic theory is that social activities will magnify the consequences of a risk event, often in unexpected ways. Think of a pebble thrown into a lake; the ripples spread far beyond the pebble's initial impact on the water. So too, a risk can spread to impact business sales, regulatory agendas, community opposition, and legal action. These consequences can in turn result in an industry or a community being stigmatized: seen as negative or bad by others who associate with it.

The news media in particular has been credited with amplifying risk consequences. For example, work at several universities in the United Kingdom (Birmingham, East Anglia, Surrey, and Queen's University in Belfast) found that whereas media coverage often brought in secondary issues associated with risk, government agencies charged with communicating risk usually failed to recognize or address such issues (UK Department of Health 2003). This dichotomy resulted in stories about the risk growing in number and outrage, without providing any support to its resolution.

Veteran researchers William Leiss at the University of Ottawa and Douglas Powell at Kansas State University took the approach one step further after studying high-profile cases of risk communication such as mad cow disease and silicone breast implants (Leiss and Powell 2005). They theorized that a risk information "vacuum" is most likely to blame for the social amplification of risks. That is, when experts refuse to provide information, a hungry public will fill the void, often with rumor, supposition, and less-than-scientific theories. Silence from experts and decision makers, particularly regulatory agencies, breeds fear and suspicion among those at risk and makes later risk communication much more difficult.

The approach has several implications for risk communicators. One is to actively plan for and respond to the social ripples that arise from a risk being identified, particularly in consensus and crisis communication. Such planning should incorporate a thorough understanding of audience needs. Another implication is to follow one of the primary principles of risk communication: ensure that information is communicated early, often, and fully. This is particularly important for crisis communication. Be the expert and share the information, before other organizations and individuals rise to fill that gap with information that, at a minimum, may make risk communication efforts more difficult and, at the worst, could well end up endangering public health or safety. For more principles of risk communication, see Chapter 6.

Social Constructionist Approach

Similar to the National Research Council's approach, this approach focuses on the flow of technical information and values, beliefs, and emotions (Waddell 1995). Many approaches consider that, during a risk assessment, the scientific community provides technical knowledge while the audience or stakeholders provide values, beliefs, and emotions through feedback on the risk communication effort or in the risk management process. The social constructionist approach holds that in fact both inputs come from both sides. In other words, the scientific community has values, beliefs, and emotions that subtly affect how risks are assessed and communicated, and the stakeholders often have technical knowledge that could affect the risk assessment and communication process.

The implication for risk communicators is that social context and culture can influence beliefs and actions of all parties. Understanding this context and facilitating an exchange of information, attitudes, values, and perceptions in both directions ("expert" to "stakeholder" and vice versa) can help build better risk decisions, whether in care, consensus, or crisis communication.

> The social constructionist model suggests that we do not, or should not, develop policy in private by some rhetorical means and then, through rhetoric, attempt to impose that policy on our fellows.
> —Craig Waddell (1995, p. 201)

CAUSE Approach

Katherine Rowan and colleagues from George Mason University suggest that risk communication is affected by the same tensions as other forms of communications:

- **C**onfidence in the communicator's character and competence—Does the audience perceive the person as sharing the same values? Is the communicator knowledgeable about the risk or its management?
- **A**wareness of the risk—Has the audience experienced the risk or seen news media reporting on it?
- **U**nderstanding of the complexities—Does the audience see the risk in its scientific, political, and social setting?
- **S**atisfaction with solutions—Does the audience agree with how the risk can be managed or does the management approach run counter to their culture or closely held beliefs?
- Willingness to **E**nact steps to mitigate the risk—Is the audience willing to act (Rowan 2017)?

Each of these tensions must be dealt with successfully for risk communication to be effective.

Risk communicators can learn a number of lessons from this approach. Choosing the best organization and spokesperson to deliver the risk information is critical. Particularly in care communication, raising awareness of the risk may need to be the first step. Messages must be built to include information beyond the technical data on the risk, to address the questions of the audience. In consensus communication especially, that audience must agree on the approach to managing the risk. And, in all types of risk communication, those at risk must be willing to act to reduce or mitigate it.

For more information on choosing a spokesperson, see Chapter 15. For more information on developing messages, see Chapter 9.

Mental Noise Approach

Vincent Covello, another luminary in the field of risk communication, cautions his students in course work and workshops to beware of mental noise when communicating risks. The approach is also used by some portions of the U.S. Department of Defense and in public health circles.

This approach holds that when people perceive themselves at risk, their ability to hear and process information decreases dramatically. Under such circumstances, the ability to attend to and retain information is estimated to be 80% less than normal. This limitation is particularly true in sudden, unexpected crises. For example, those responding to the bombing of the Oklahoma City federal building in April 1995 found that both verbal and written information had to be provided, sometimes multiple times, for the victims' families to understand what had happened and what they should do next (Blakeney 2002).

The implication for those communicating risk is that risk information must be carefully packaged and presented, particularly in crisis communication. Proponents of the approach advise that no more than three key messages, repeated frequently, should be used, along with reinforcement of verbal and written communications with visuals, and ruthless removal of jargon, technical terms, and acronyms. For additional information on designing risk information materials, see Chapter 13.

Social Network Contagion Approach

Organizational studies have looked at the way social networks influence behavior and attitudes in the workplace. The results of these studies suggest that who we spend time with affects how we view the world. More recently, this approach has been applied to risk communication efforts (for example, see Scherer and Cho 2003).

The approach holds that, when faced with a risk, people adopt the behaviors and attitudes of others in their social network as a response to the risk. Their network does not need to influence them intentionally; the change may come about gradually as a result of shared time and similar perceptions in other areas. The stronger the social tie and the more frequent the interaction, the more likely will be the cohesiveness of reaction to the risk. These social ties may also be built on social media such as Facebook.

The implication for those communicating risk is that we must look beyond individuals to their communities when communicating risk. In trying to encourage people to modify risky behaviors (for example, in care communication), getting their social network to endorse or reinforce less risky actions might be more effective than targeting individuals. Involving all members of a social network might be the only way to gain participation in some areas for consensus communication. In crisis communication, partnering with key social leaders may spread the news the fastest. For more information on understanding the needs of the audience, see Chapter 8. For partnering with social leaders, see Chapter 20.

We must look beyond individuals to their communities when communicating risk.

Social Trust Approach

The social trust approach also grew from social science research, particularly that of George Cvetkovich and Tim Earle. This approach holds that a person's trust in an institution (for example, a government agency) is built on an understanding of the institution's goals, motives, and actions in relationship to the person's values. In other words, if I perceive, based on observed behaviors, that the organization managing the risk has the same values I have, I will place my trust in them to appropriately manage the risk. Research has found that the higher the trust, the lower the estimate of risk and the higher the estimate of benefits (Cvetkovich and Winter 2001).

Another aspect of this approach is called the asymmetry principle. Researchers found that it is more difficult to create or earn trust than to destroy it. Studies show that if people do not trust an organization, negative information associated with that organization reinforces their distrust, whereas positive information is discounted. Fortunately, the converse is also true: If people trust an organization, positive information will reinforce that trust, and negative information will be discounted (Cvetkovich et al. 2002).

Trust and confidence are being shown as increasingly important to how people perceive risks and how they respond to risk management strategies.

When the control of risk is not at the personal level, trust becomes a major and perhaps the most important variable in public acceptance of the risk management approach (Cvetkovich and Winter 2001). This premise is also supported by work by Vincent Covello, who has been credited with the idea that when people perceive themselves to be at risk, they understand and put into practice only those messages that come from sources they perceive as trustworthy and credible. Some researchers believe that this perception of trust and credibility comes from the audience's perceptions of the organization's ability to care, commitment to resolving the risk, competence, and honesty. For lay audiences, the single biggest contributor to increasing trust and credibility is the organization's ability to care or show empathy. In some cases, we have found that for industrial applications (employer–employee relationships), honesty may be the biggest contributor to trust.

The implication for those communicating risk is that information alone, no matter how carefully packaged and presented, will not communicate risk effectively if trust and credibility are not established first. Trust and confidence are being shown as increasingly important to how people perceive risks and how they respond to risk management strategies. Unfortunately, how an organization is perceived is often beyond the control of risk communicators. Some techniques for building trust and credibility can be found in Chapters 4 and 5.

Case Study: Breaking Social Trust Lengthens Process

A breakdown in trust between stakeholders in a consensus communication effort derailed an environmental remediation project for years.

In 2006, the Canadian government started a planning process to remediate highly toxic arsenic trioxide contamination at the former Giant Mine site in the Canadian Northwest Territories. Many of the interested and affected stakeholders were First Nations (indigenous) peoples who lived nearby. Vocal from the beginning, community groups continually expressed lack of trust in the process and in the government officials themselves. Conflicts and lack of cooperation delayed the start of remediation by several years, during which time the arsenic trioxide underground continued to leach into the surrounding environment.

Several years into the process, risk communication researchers interviewed community and government participants, documenting specific areas of mistrust (Jardine et al. 2013). A legacy of mistrust had existed between the community—particularly Aboriginal Peoples—and government for years. Some community members felt the government cared about development more than the environment or the lives of those affected. They felt that the remediation option decision—to freeze the contaminated ground—was made without enough consultation or input from those affected by the decision. They were concerned that the government was both the proponent and the regulator of the site, creating a potential conflict of interest. Community members also didn't trust the government to commit to the long-term care required for the frozen-ground option.

The government proponents interviewed in this study were well aware of conflicts caused by trust issues. They wanted to reassess their assumptions of their role in developing and implementing remediation plans. They realized they needed to make the process more transparent, increase meaningful dialogue with stakeholders, and share decision-making power. Following a recommendation in the project's environmental assessment in 2014, the Canadian government devoted more funding for community participation and formation of consultation groups. Remediation of the Giant Mine site began in 2017.

This case study demonstrates what can happen when stakeholder values are at odds, causing social trust to break down. "The ensuing consultation related to the environmental assessment has been much more prolonged and expensive than would have probably occurred if confidence and trust in government was higher and if the original communication around the remediation planning had been based on a more dialogic model," the researchers said.

Evolutionary Theory Approach

The theory of evolution has also contributed to effective risk communication (for example, Tucker et al. 2008). The idea is that the way we evolved from hunter-gatherers shapes how we process, perceive, and understand risks. Natural selection resulted in people who value fairness, equity, justice, prudence, and generosity, and who fear breaking social contracts. In general, humans are hardwired to cooperate in sharing resources. Biomathematics experts W. Troy Tucker and Scott Ferson propose six categories of risk that humans have routinely faced: disease, paternity, accidents, intergroup competition (war), subsistence failure, and cooperation failure. People trade risks among these categories. For example, stakeholders may insist on more stringent regulations for a new landfill, resulting in more time on the job for workers (and more potential for accidents), if it decreases the chance of groundwater contamination, which could prevent farming in some areas (subsistence failure).

Risk communicators, then, could expect that risks perceived as unfair, unjust, costly, wasteful, or harmful to a single group of people may be viewed as more dangerous and less acceptable by stakeholders. Other research bears out these characteristics. For example, see Chapter 4 and the section on Hostility and Outrage.

CARE COMMUNICATION APPROACHES

While the following models focus primarily on care communication situations, they may also have implications for consensus and crisis communications.

Mental Models Approach

> In the absence of evidence, no one can predict confidently how to communicate about a risk. Effective and reliable risk communication requires empirical study.
> —Granger Morgan et al. (2002, p. 182)

The concept of how people understand and view various phenomena, or their mental models of the situation, is grounded in cognitive psychology and artificial intelligence research (Geuter and Stevens 1983). The mental models approach as applied to risk communication comes largely from researchers at Carnegie-Mellon University (Morgan et al. 2002). The approach was used successfully in other forms of technical communication, such as computer documentation, before being used to focus risk communication efforts.

Using this approach, communicators begin by determining to which audience the risk communication efforts will be directed. They then interview members of that audience to identify how the audience views the risk. For example, in one of the more publicized efforts, for the U.S. Environmental Protection Agency's radon information program, researchers interviewed members of the audience using open-ended questions that gradually became more focused as the interview progressed (from "tell me everything you know about radon" to "tell me more about how it affects you"). Researchers used answers from all the participants to compile a "mental model," a view of how the audience saw radon, its exposure routes, and dangers. They then compared this mental model with the expert model, the model that scientists use to evaluate radon. Researchers followed up with a more focused questionnaire to verify differences between the two models and designed risk communication messages to address the gaps or inconsistencies in the audience's knowledge (Morgan et al. 1992). The intent was not to convince the public to think like scientists but to identify the information the public would need to make an informed decision.

The implication for those who communicate risks is that to really communicate with your audience, you must understand what your audience already believes about the risk. Risk communication messages that do not address key audience concerns or account for existing beliefs will fail. At the very least, risk communication efforts must incorporate some audience analysis.

For care communication, which often has as its audience a wide cross section of the population, the communicators will need to understand lifestyle characteristics of each portion of the audience to tailor risk messages. For example, teenagers have been found to be more likely to engage in drunk driving than other age groups. How do their beliefs differ from those of other age groups to make them more likely to drive while drunk?

For consensus communication, the communicators will need to understand the concerns and beliefs of the audience before they can hope to agree on a solution. For example, how do different Native American tribes view the environment and how will these views affect their stance on hazardous waste cleanup?

For crisis communication, communicators need to understand the cultures of the audience to be able to discuss ways to mitigate a crisis. A specific example is the illness that struck the Navajo in northern New Mexico and Arizona in 1993 (dubbed the "mystery illness" by the news media because the cause eluded health care professionals for some time). The illness was found to be spread by breathing airborne particles of infected mouse dung, which would seem to be a relatively easy source to avoid. However, because sweeping was part of the religious and cultural activities of the Navajo, and sweeping raised the dust in which the dung was often found, the source proved to be a more insidious one to combat. See Chapter 8 for more information on understanding your audience.

Extended Parallel Process Model Approach

This model, which grew out of health risk communication research, looks at how and why people respond to fear-based messages. Such messages require the audience to evaluate the threat and the ability of the recommended action to resolve the threat. To evaluate the threat, the audience looks at relevancy and severity. If they deem the hazard as irrelevant or insignificant to them, they will likely take no action to mitigate it. If they decide that it is relevant to them or severe enough not to want to take chances, they consider their own abilities and the efficacy of the approach. If they believe that they are capable of taking the action and that the action will work, they generally take the recommended action. However, if they believe themselves incapable of taking the action or see the action as useless, they will act to control fear instead of controlling the hazard. Audiences generally control fear through denial or hostility (Witte et al. 2001).

The implication for risk communicators, particularly in care communication, is to make sure that messages are relevant to the intended audience and clearly show the severity of the hazard. The audience must be capable of taking the recommended actions (physically, emotionally, socially, and financially), and they must believe that the action will work. Without such underpinnings, messages may well evoke more hostility than action. For more information on crafting messages, see Chapter 9.

Description-Experience Gap Approach

Researchers at the Max Planck Institute of Human Development in Berlin point to the challenge of the description–experience gap in communicating risks (for example, Hertwig and Frey 2015). Their work identified a key factor underlying disagreements between risk experts and the public when it came to how risks were perceived: how each acquired understanding through either explicit descriptions like data or sequential experience of risky events. For example, some parents refused to vaccinate their children based on statistics that concerned them while their doctors encouraged vaccination based on years of experience seeing no side effects. In the case of ionizing radiation, scientists often discount the danger based on data that demonstrate the efficacy of good industrial hygiene while the public fears it based on mostly second-hand experience from several disastrous events.

The implication for risk communicators, particularly for care communication, is to identify how your audience gained its current understanding of the hazard. Is that understanding built on empirical evidence or direct or second-hand experience? Studies have found that, in general, when making a risk-related decision based on experience, people tend to discount rare events while decisions made from descriptions overestimate rare events (Hertwig and Frey 2015). For more information on understanding your audience, see Chapter 8.

Risk Information Seeking and Processing Approach

Sharon Dunwoody at the University of Wisconsin-Madison and Robert J. Griffin at Marquette propose that the way people seek and process information plays an important role in risk communication. When made aware of a risk, people tend to seek information, choosing channels and determining whether to attend to their messages. Dunwoody and Griffin suggest channels bring information together in a mediated manner. Think how the news media or friends and experts synthesize information from a variety of sources. The person seeking risk information weighs the credibility of these channels on two key factors: (i) the extent to which the channel is viewed as biased or sensationalizing the risk, and (ii) the extent to which the channel is viewed as providing cues that help people process risk information (Dunwoody and Griffin 2014).

However, even those willing to acknowledge gaps in their understanding might not seek more information depending on several factors such as their perception (fear), level of potential impact, ability to search for information, and belief in the available channels. Once they gather the information, they must then process it using rules of thumb. Researchers have found that peer pressure, or at least the expectation of understanding from others, may make some people seek and process risk information (Dunwoody and Griffin 2015). One of the implications for risk communicators is to consider the credibility of the channel, not just the source. Often risk communicators work hard to identify the best subject matter expert with sufficient empathy, commitment, competence, and honesty to engender trust when delivering risk information. Just as important is to have the audience view the channel (website, news media, journal or magazine article, etc.) as similarly trustworthy. Another implication is to provide risk information in a variety of ways, so those seeking it have the best opportunity to find it. Then too, using social influencers to encourage information seeking and processing may expand the reach of risk messages.

For more information on channels or methods, see Chapter 10. For more information on working with social influencers, see Chapter 20.

> "Risk information seeking and processing will be driven primarily by a person's subjective assessment of the gap between what he knows about a risk and what he feels he needs to know in order to respond to the risk adequately."
> —Dunwoody and Griffin (2015)

CONSENSUS COMMUNICATION APPROACH

Perhaps the most impactful approach for consensus communications is the theory developed by Everett Rogers (Rogers and Kincaid 1981) that communication (including risk communication) is an iterative long-term process in which the values (culture, experiences, and background) of the risk communication organization and the audience affect the process of communication. The organization issues information, and the audience processes it to the extent possible and issues its own information ("we don't trust you"; "what is this stuff?"; and "do you want me to do something?"). The organization then processes that information and responds by issuing additional or modified information. The two groups continue to cycle information back and forth, slowly converging onto common ground.

The implication for those communicating risk is that the audience must be involved in the risk communication process and that the process must be a dialogue, not a monologue on the part of the organization. Continuous feedback and interpretation are necessary for the communication to be effective. This is true for care and crisis communication, but particularly for consensus communication. For care communication, the dialogue may be with a sample of the intended audience. For crisis communication, the dialogue may be with community members involved in emergency planning efforts. For consensus communication, of course, the dialogue is with the group with which you are trying to reach an agreement.

Additional consensus communication approaches build from facilitation and negotiation disciplines. See the Resources chapter for more information.

CRISIS COMMUNICATION APPROACHES

Emergencies and crises have been the focus of many risk communication approaches.

Original Crisis Communication Approach

The original crisis communication approach holds that those who are communicating the risk use every device to move the audience to appropriate action. For example, in a flood, they should construct messages that cause the audience to evacuate to higher ground while refraining from hindering the work of rescue groups. As one risk communication professional explained, “You only give the audience the information they need to get them to leave. Anything else is extraneous.” Given this goal, passing on such information as probability of risk and alternatives seems pointless. This approach holds that the organization knows what is best for the audience and should act as a firm parent in enforcing its opinion.

In an era when those who are affected by a risk are demanding more and more involvement, this approach seems outdated in the extreme. Even in public health emergencies such as a bioterrorist attack, the public’s demand for information is likely to be higher than this approach would satisfy. Research funded by the U.S. Centers for Disease Control and Prevention (CDC) found that, in the case of terrorist attacks using a variety of weapons of mass destruction ranging from a radiation dispersal device to plague, audiences wanted to know at a minimum about the incident, the threat agent, and the health issues (Becker 2004). The implication for those who are communicating in a crisis is that persuasion, which is discussed in Chapter 5, is justified in this case and that information given to those at risk should be limited. Our own experience and a growing body of evidence suggest that people are more likely to change behavior when they know the “why,” not just the “what” or “how.”

Crisis and Emergency Communication Approach

The CDC has partnered with a number of renowned risk communication experts, drawing on lessons learned in public health emergencies and extensive research in the field, to develop an approach specific to crises and emergencies. Communication centers around five stages: pre-crisis, initial crisis, maintenance, resolution, and evaluation, with strategy and tactics changing in each stage. For example, in the pre-crisis stage, risk communicators would focus on building partnerships with other agencies and the community, while in the evaluation stage, they would focus on evaluating plan performance, documenting lessons learned, and determining ways to improve (Reynolds and Seeger 2014).

The approach suggests several lessons for risk communicators. First, we must change what we do in response to the situation. If the carefully crafted message developed at the pre-crisis stage does not appear to be motivating the audience to take appropriate action, it needs to be revised. The partnerships built early on must be maintained. Second, pre-event planning is critical to effectiveness. While a crisis is never expected for a certain day or time, being prepared for the eventuality will ease communication as well as response. Finally, evaluation is key to improvement. For more information on emergency communication, see Chapter 22. For more information on building partnership, see Chapter 20. For more information on evaluation, see Chapter 21.

Relational Dialectics Approach

Respected university researchers Robert Littlefield and Timothy Sellnow point to the tensions between audience and organizations as key factors in communicating risks (for example, Littlefield and Sellnow 2015). These tensions include how quickly to release information, the amount of information to be shared, level of control of the narrative, confidence in the information (acceptance of uncertainty and ambiguity), prioritization of interest (expert or public), level of responsibility (as the cause of the crisis), and emotional connection between the audience and the organization. These tensions affect such areas as interactions with the news media, collaborations and partnerships, and preparedness planning. The approach also stresses the difference between culturally sensitive and culture-centered communication. In the former, the organization charged with communicating decides on the languages, methods, and spokespeople to be used in the risk communication effort, factoring in an understanding of audience needs. In the latter, the audience decides on how the risk will be communicated.

The implication for risk communicators is to not only understand the audience but to involve the audience fully in crisis communication. This can be best accomplished during preparedness planning, but social media has also made it possible to work collaboratively with community members during a crisis. For example, during fires in Southern California, a local public radio station took over mapping of the event for the public when government resources became overwhelmed (Lesperance et al. 2010).

For more information on understanding your audience, see Chapter 8. For more information on using social media to communicate risk information, see Chapter 19. For more information on partnerships, see Chapter 20. For more information on emergency risk communication, see Chapter 22.

SUMMARY

No one approach to risk communication can be applied equally well to all the purposes, audiences, and situations for which risk is being communicated. Instead, approaches to risk communication come from a variety of disciplines, each of which can provide insight to those who are communicating the risk. Understanding the various approaches and their implications can provide us with a repertoire of ways to develop our risk communication efforts, giving us a greater chance of success than if we were communicating without this knowledge.

REFERENCES

Becker, S. M. 2004. “Emergency Communication and Information Issues in Terrorist Events Involving Radioactive Materials.” *Biosecurity and Bioterrorism: Biodefense Strategy, Practice, and Science*, 2 (3): 195–207.

Blakeney, R. L. 2002. “Providing Relief to Families after a Mass Fatality: Roles of the Medical Examiner’s Office and the Family Assistance Center.” OVC Bulletin, November, U.S. Department of Justice, Office of Justice Programs, Office for Victims of Crime, Washington, DC.

Cvetkovich, G. and P. L. Winter. 2001. “Social Trust and the Management of Risks to Threatened and Endangered Species.” Presented at the Annual Meeting of the Society for Risk Analysis, December 2–5, 2001, Seattle, Washington.

Cvetkovich, G., M. Siegrist, R. Murray, and S. Tragesser. 2002. “New Information and Social Trust: Asymmetry and Perseverance of Attributions about Hazard Managers.” *Risk Analysis*, 22 (2): 359–367.

Dunwoody, S., and R. J. Griffin. 2014. “The Role of Channel Beliefs in Risk Information Seeking.” In J. Arvai, and L. Rivers, III, eds., *Effective Risk Communication*. Routledge, New York, pp. 220–223.

Dunwoody, S., and R. J. Griffin. 2015. “Risk Information Seeking and Processing Model.” In H. Cho, T. Reimer, and K. A. McComas, eds., *The SAGE Handbook of Risk Communication*. SAGE, Thousand Oaks, California, pp. 102–116.

Flynn, J., P. Slovic, and H. Kunreuther, eds. 2001. *Risk, Media, and Stigma: Understanding Public Challenges to Modern Science and Technology*. Earthscan, London.

Geuter, G. and A. L. Stevens, eds. 1983. *Mental Models*. Lawrence Erlbaum Associates, Hillsdale, New Jersey.

Griffin, R. J., S. Dunwoody, F. Zabala, and M. Kamerick. 1994. “Public Reliance on Risk Communication Channels in the Wake of the Cryptosporidium Outbreak.” Paper presented at the Society for Risk Analysis Annual Meeting, December 1994, Baltimore, Maryland.

Hertwig, R., and R. Frey. 2015. “The Challenge of the Description–Experience Gap to the Communication of Risks.” In H. Cho, T. Reimer, and K. A. McComas, eds., *The SAGE Handbook of Risk Communication*. SAGE, Thousand Oaks, California, pp. 29–40.

Jardine, C., L. Banfield, S. M. Driedger, and C. M. Furgal. 2013. “Risk Communication and Trust in Decision-Maker Action: A Case Study of the Giant Mine Remediation Plan.” *International Journal of Circumpolar Health*, 72. doi: 72:10.3402/ijch.v72i0.21184.

Kasperson, R. E. 1986. “Hazardous Waste Facility Siting: Community, Firm, and Governmental Perspectives.” In R. E. Kasperson, ed., *Hazards: Technology and Fairness*. National Academy of Engineering/National Academy Press, Washington, DC, pp. 118–144.

Kasperson, R. E., O. Renn, P. Slovic, H. S. Brown, J. Emel, R. Goble, J. X. Kasperson, and S. Ratick. 1988. “The Social Amplification of Risk: A Conceptual Framework.” *Risk Analysis*, 8: 177–187.

Leiss, W. and D. Powell. 2005. *Mad Cows and Mother’s Milk: The Perils of Poor Risk Communication*, 2nd ed. McGill-Queen’s University Press, Montreal, Quebec, Canada.

Lesperance, A. M., M. A. Godinez, and J. R. Olson. 2010. *Social Networking for Emergency Management and Public Safety*, PNNL-19601. Pacific Northwest National Laboratory, Richland, Washington.

Littlefield, R. S., and T. L. Sellnow, eds. 2015. *Risk and Crisis Communication: Navigating the Tensions Between Organizations and the Public*. Lexington Books, Lanham, Maryland.

Morgan, M. G., B. Fischhoff, A. Bostrom, L. Lave, and C. J. Atman. 1992. “Communicating Risk to the Public.” *Environmental Science and Technology*, 26 (11): 2048–2056.

Morgan, M. G., B. Fischhoff, A. Bostrom, and C. J. Atman. 2002. *Risk Communication: A Mental Models Approach*. Cambridge University Press, New York.

NRC (National Research Council). 1989. *Improving Risk Communication*. National Academy Press, Washington, DC.

NRC (National Research Council). 1996. *Understanding Risk: Informing Decisions in a Democratic Society*. National Academy Press, Washington, DC.

Reynolds, B., and M. Seeger. 2014. Crisis and Emergency Risk Communication, 2014 edition. https://emergency.cdc.gov/cerc/index.asp (accessed July 24, 2017).

Rogers, E. M. and D. L. Kincaid. 1981. *Communications Networks: Toward a New Paradigm for Research*. The Free Press, New York.

Rowan, K. E. 2017. “Risk Communication.” In Craig R. Scott and Laurie Lewis (Editors-in-Chief), *The International Encyclopedia of Organizational Communication*. John Wiley & Sons, Inc., New York.

Sandman, P. M. 1987. “Risk Communication: Facing Public Outrage.” *EPA Journal*, November: 21–22.

Sandman, P. M. 2003. “Four Kinds of Risk Communication.” *The Synergist*, April: 26–27.

Scherer, C. W. and H. Cho. 2003. "A Social Contagion Theory of Risk Perception." *Risk Analysis*, 23 (2): 261–267.

Shannon, C. E. 1948. "A Mathematical Theory of Communication." *Bell System Technical Journal*, 27: 379–425, 623–656.

Tucker, W. T. and S. Ferson, 2008. "Strategies for Risk Communication: Evolution, Evidence, Experience." *Annals of the New York Academy of Sciences*, 1128. DOI: 10.1196/annals.1399.000.

UK Department of Health. 2003. "The Social Amplification of Risk: The Media and the Public." http://www.hse.gov.uk/research/crr_pdf/2001/crr01329.pdf (accessed October 10, 2017).

Waddell, C. 1995. "Defining Sustainable Development: A Case Study in Environmental Communication." *Technical Communication Quarterly*, 4 (2): 201–216.

Witte, K., G. Meyer, and D. Martell. 2001. *Effective Health Risk Messages*. Sage Publications, Thousand Oaks, California.

ADDITIONAL RESOURCES

Hannigan, J. A. 1995. *Environmental Sociology: A Social Constructionist Perspective*. Routledge Press, London.

Johnson, B. B. 1993. "The Mental Model' Meets 'the Planning Process': Wrestling with Risk Communication Research and Practice." *Risk Analysis*, 13 (1): 5–8.

Rowan, K. E. 1991. "Goals, Obstacles, and Strategies in Risk Communication: A Problem-Solving Approach to Improving Communication about Risks." *Journal of Applied Communication Research*, November: 300–329.

Sandman, P. M. 1989. "Hazard versus Outrage in the Public Perception of Risk." In V. T. Covello, D. B. McCallum, and M. T. Pavlova, eds., *Effective Risk Communication: The Role and Responsibility of Government and Nongovernment Organizations*. Plenum Press, New York, pp. 45–49.

3

LAWS THAT MANDATE RISK COMMUNICATION

Although many organizations have realized that it is good business practice to keep communities and interested parties aware of potential risks, risk communication is still often conducted as a result of a law, regulation, or other government inducement. A number of laws and regulations in the United States mandate risk communication as part of the risk assessment and risk management process. New international guides and standards also stipulate risk communication activities.

Although these laws run to several volumes, making it difficult for anyone outside of the legal profession to really understand them, those who are communicating risk need to be aware of the laws affecting risk communication efforts and what these laws entail.

Failing to understand the laws and regulations can have several repercussions:

Although many organizations have realized that it is good business practice to keep communities and interested parties aware of potential risks, risk communication is still often conducted as a result of a law, regulation, or other government inducement.

Risk Communication: A Handbook for Communicating Environmental, Safety, and Health Risks, Sixth Edition. Regina E. Lundgren and Andrea H. McMakin.
© 2018 The Institute of Electrical and Electronics Engineers, Inc., and Regina E. Lundgren and Andrea H. McMakin. Published 2018 by John Wiley & Sons, Inc.

- Some member of your audience (who knows more than you do about the law) may sue your organization for failing to follow due process. This has happened to a number of federal agencies because they took a law or even their own implementing regulations less seriously than did the audience.
- Your arguments for continued or increased funding for risk communication are weakened if you do not know the law. Organizations are more likely to take notice if the risk communication effort is "required" than if it is optional. Optional programs get cut in budget crunches, whereas those required by law usually do not.
- The agency in charge of implementing the regulation may shut down your operations or levy a heavy fine if you are not in compliance.

This chapter highlights some of the major federal laws within the United States and selected international standards. Many states have similar rulings, often with more stringent requirements. In addition, many agencies and organizations have guidelines for implementing the regulations they must comply with most frequently. For example, the National Environmental Policy Act has counterparts in many states (individual state environmental policy acts), and several federal agencies (for example, the U.S. Department of Energy and U.S. Department of Defense) have developed their own policies and procedures to comply with both regulations. In addition, from time to time politics puts federal laws in a flux. Check your state and local laws and how your organization has chosen to implement these laws before beginning your risk communication[1] efforts.

COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION, AND LIABILITY ACT

Also known as CERCLA or Superfund, this act and its reauthorization (Superfund Amendment and Reauthorization Act, or SARA) require that specific procedures be implemented to assess the release of hazardous substances at inactive waste sites. Those procedures involve the inclusion of "community relations" in the evaluation process. The term "community relations" refers to developing a working relationship with the public to determine acceptable ways to clean up the site. Figure 3.1 illustrates how the community relations process fits into the technical process for cleanup. Key communication pieces are as follows:

- **Community relations plan.** The community relations plan is very similar to the communication plan described in Chapter 12, "Develop a Communication Plan." The plan incorporates information about the site (for example, history, levels of contamination, and types of contamination), the community interested in the cleanup (demographic information), their concerns and beliefs about the site, and which communication methods will be used to address these concerns and include the public in the cleanup process. Under U.S. Environmental Protection Agency guidelines, in developing the community relations plan, representatives of the organization responsible for cleanup are required to meet with members of the community to listen to their concerns. These community interviews are generally conducted one on one in a location where each member feels comfortable (their home, the local tavern, etc.). The plan is usually updated at least yearly throughout the process, which averages 8 years but, in some cases, takes decades.

---

[1] In this chapter, we sometimes use the terms "risk communication" and "public involvement" interchangeably because many of the regulations use the same term to mean both.

- **Administrative record.** The administrative record is a set of all documents and other information that were used to make a decision about steps in the cleanup process. It is housed in a public library or other location where the audience can have easy access to it. It is updated at each step in the cleanup process.
- **Information repository.** An information repository is a file containing site information, documents on site activities, and general information about the Superfund program. It too is housed in a library or other location where the audience can have easy access to it. It is updated regularly (the interval depends on how much activity is going on at the site and could range from weekly to quarterly).
- **Advertisement of public involvement opportunities.** Fact sheets, news releases, interactive websites, and proposed plans are some of the devices used to alert the public to opportunities for involvement in how cleanup decisions are made. Figure 3.1 shows the points at which the U.S. Environmental Protection Agency suggests that some of this information be released.

Tools to accomplish community relations (and risk communication) for Superfund can be found on the U.S. Environmental Protection Agency website under Community Involvement Toolkit (https://www.epa.gov/superfund/community-involvement-tools-and-resources).

EMERGENCY PLANNING AND COMMUNITY RIGHT-TO-KNOW ACT

This act, a part of SARA, is a freestanding law that requires that the public be provided with information about hazardous chemicals in the community and establishes emergency planning and notification procedures to protect the public from a release of those chemicals. The act also calls for the creation of state emergency response commissions to guide planning for chemical emergencies. Such state commissions have created local emergency planning committees to

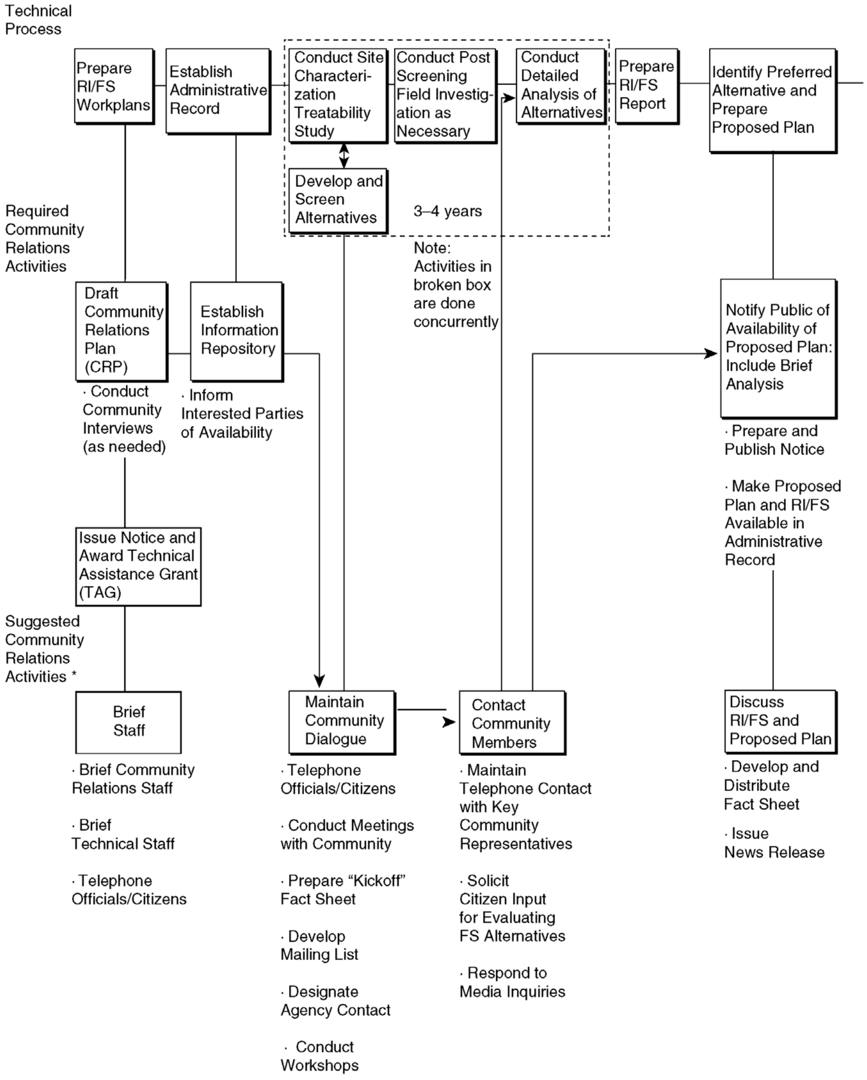

Technical Process
Prepare RI/FS Workplans
Establish Administrative Record
Conduct Site Characterization Treatability Study
Conduct Post Screening Field Investigation as Necessary
Conduct Detailed Analysis of Alternatives
Prepare RI/FS Report
Identify Preferred Alternative and Prepare Proposed Plan
Develop and Screen Alternatives
3–4 years
Note: Activities in broken box are done concurrently
Required Community Relations Activities
Draft Community Relations Plan (CRP)
· Conduct Community Interviews (as needed)
Establish Information Repository
· Inform Interested Parties of Availability
Notify Public of Availability of Proposed Plan: Include Brief Analysis
· Prepare and Publish Notice
· Make Proposed Plan and RI/FS Available in Administrative Record
Issue Notice and Award Technical Assistance Grant (TAG)
Suggested Community Relations Activities *
Brief Staff
· Brief Community Relations Staff
· Brief Technical Staff
· Telephone Officials/Citizens
Maintain Community Dialogue
· Telephone Officials/Citizens
· Conduct Meetings with Community
· Prepare “Kickoff” Fact Sheet
· Develop Mailing List
· Designate Agency Contact
· Conduct Workshops
Contact Community Members
· Maintain Telephone Contact with Key Community Representatives
· Solicit Citizen Input for Evaluating FS Alternatives
· Respond to Media Inquiries
Discuss RI/FS and Proposed Plan
· Develop and Distribute Fact Sheet
· Issue News Release

Figure 3.1. Risk communication and public involvement activities associated with the Superfund cleanup process. RI/FS, remedial investigation/feasibility study.

*Ongoing throughout RI/FS process.

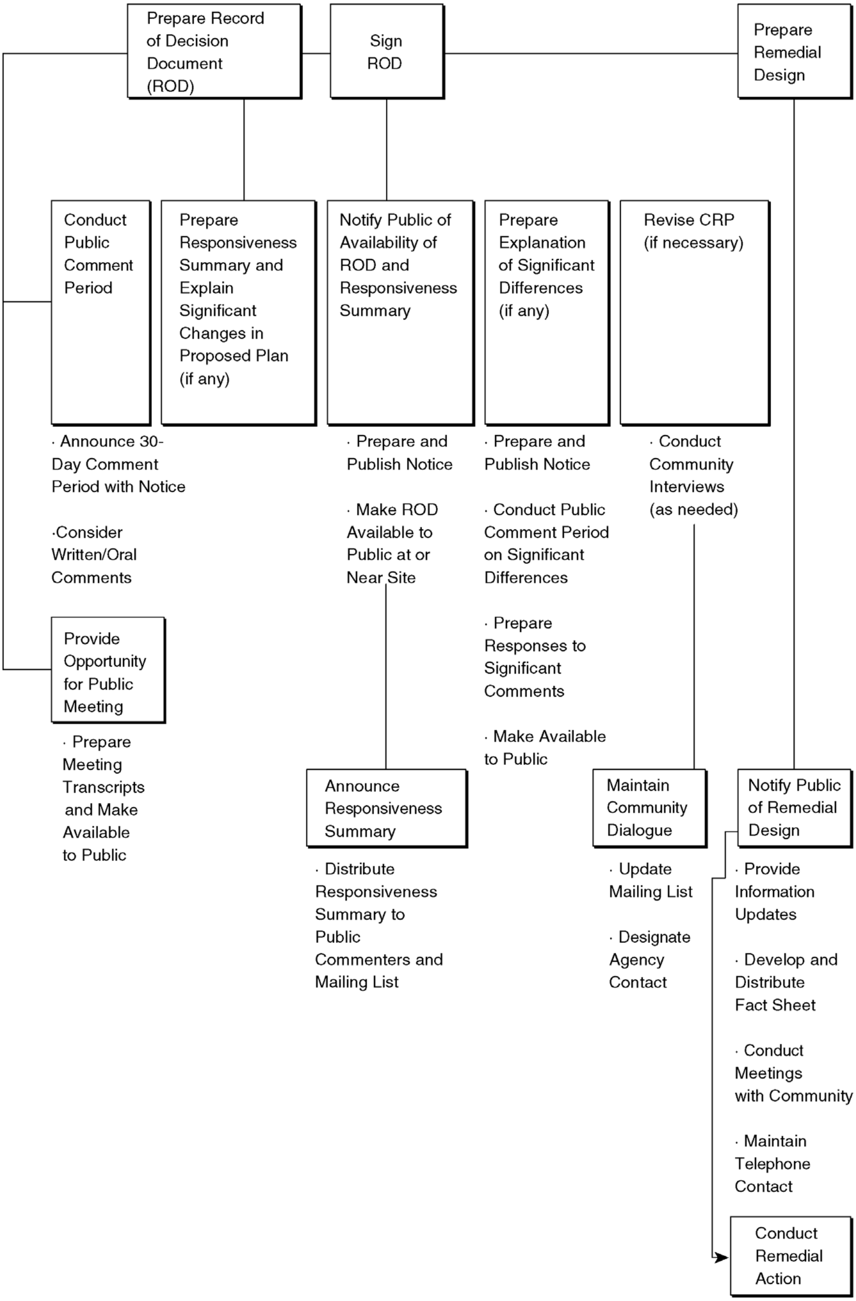

Prepare Record of Decision Document (ROD)
Sign ROD
Prepare Remedial Design
Conduct Public Comment Period
· Announce 30-Day Comment Period with Notice
·Consider Written/Oral Comments
Prepare Responsiveness Summary and Explain Significant Changes in Proposed Plan (if any)
Notify Public of Availability of ROD and Responsiveness Summary
· Prepare and Publish Notice
· Make ROD Available to Public at or Near Site
Prepare Explanation of Significant Differences (if any)
· Prepare and Publish Notice
· Conduct Public Comment Period on Significant Differences
· Prepare Responses to Significant Comments
· Make Available to Public
Revise CRP (if necessary)
· Conduct Community Interviews (as needed)
Provide Opportunity for Public Meeting
· Prepare Meeting Transcripts and Make Available to Public
Announce Responsiveness Summary
· Distribute Responsiveness Summary to Public Commenters and Mailing List
Maintain Community Dialogue
· Update Mailing List
· Designate Agency Contact
Notify Public of Remedial Design
· Provide Information Updates
· Develop and Distribute Fact Sheet
· Conduct Meetings with Community
· Maintain Telephone Contact
Conduct Remedial Action

Figure 3.1. *Continued*

ensure community participation and planning. Organizations that generate hazardous chemicals must produce a list each year of the quantities of chemicals stored at each site and make it available to the public and regulatory agencies. In addition, organizations must report any accidental release of hazardous chemicals to the environment and in some cases file reports on routine emissions as well.

EXECUTIVE ORDER 12898, ENVIRONMENTAL JUSTICE IN MINORITY POPULATIONS AND LOW-INCOME POPULATIONS

Presidential or executive orders provide requirements to federal government agencies and departments. These agencies and departments in turn often pass along similar requirements to civilian organizations that contract to them. This order requires that government agencies and departments consider any potentially disproportionate human health or environmental risks to minority or low-income populations posed by the organization’s activities, policies, or programs. As noted in Chapter 5, environmental equity (or environmental justice) has become a rallying cry across the nation as civic organizations have begun to realize that hazardous waste facilities and other industries perceived to be “risky” were apparently more often being sited in minority or low-income areas (for example, see Bullard 1990).

One of the requirements of the order is for agencies to consider translating crucial public documents and public meetings related to human health or environmental risks for those in the audience with limited skills in English. It also requires that information related to human health or environmental risks be concise, understandable, and readily accessible to the public.

EXECUTIVE ORDER 13045, REDUCE ENVIRONMENTAL HEALTH AND SAFETY RISKS TO CHILDREN

This order requires that federal agencies and departments consider the potentially disproportionate health and safety impacts to children from the organization’s activities, policies, and programs. Although the order does not require risk communication per se, it does require that agencies considering enacting regulations submit risk information specifically related to children. Agencies and contractors supporting them need to be aware of this requirement so as to effectively communicate the risks.

> This executive order says to every federal agency and department: put our children first. We Americans owe our largest responsibility to our smallest citizens. From now on, agencies will have to take a hard look at the special risks and disproportionate impact that standards and safeguards have on our children.
> —Former Vice President Albert Gore, national press conference at the Children’s National Medical Center, April 21, 1997

FOOD AND DRUG ADMINISTRATION REGULATIONS ON PRESCRIPTION DRUG COMMUNICATION

The U.S. Food and Drug Administration is responsible for overseeing the implementation of a number of regulations on prescription drug use, including labeling and direct-to-consumer communication. For example, the Office of Prescription Drug Promotion has the mission to protect public health by ensuring that prescription drug information is truthful, balanced, and accurately communicated. The office provides a comprehensive surveillance, enforcement, and education program. Direct-to-consumer television ads must be reviewed by the office before showing publicly, and other materials may require review as well. Risk communicators charged with sharing information about prescription drugs will want to review Food and Drug Administration guidance early in the planning process to ensure that appropriate time is available for reviews and revision.

NATIONAL ENVIRONMENTAL POLICY ACT

This is the act that mandates environmental impact statements and other environmental assessments. Under this law, any time a federal agency takes some "major" action (whether it be their own action or the granting of a federal permit or right of way), it must consider the impact of that action on the environment. Depending on the potential level of impact, this consideration will be documented in one of the following:

- **Categorical exclusion report.** A categorical exclusion report shows that the agency has considered the action and has determined that it obviously will not have an effect on the environment.
- **Environmental assessment.** An environmental assessment is usually written by an outside organization that has analyzed the action and determined that it will or will not have an effect on the environment.
- **Environmental impact statement.** An environmental impact statement is usually written by an outside organization when the federal agency has determined that the action is likely to have a significant impact on the environment.

Many states have similar documentation requirements for actions taken by state agencies. Each type of assessment has different communication requirements, which become more complex as the assessment becomes more involved. The categorical exclusion report is often simply several standard forms that are filled out and filed. The environmental assessment, although a public document, basically serves to help the agency decide whether an environmental impact statement is necessary or whether the agency can issue a Finding of No Significant Impact (referred to as a "FONSI"). An environmental assessment should contain information on the need for the proposed action, alternatives to the proposed action, environmental impacts of the proposed action and alternatives, and a listing of agencies and persons consulted in the preparation of the report. Although public involvement is not required for an environmental assessment, some agencies nevertheless issue the report for public comment and consider those comments in determining whether an environmental impact statement will be necessary.

> The most complex communication requirements are associated with the environmental impact statement.

The most complex communication requirements are associated with the environmental impact statement. Key communication pieces connected with the environmental impact statement are the following:

- **Notice of intent.** The agency must file a notice in the *Federal Register* detailing its intent to prepare an environmental impact statement, the possible content of that statement, and a request for public comments. The notice is usually several paragraphs to several pages long.
- **Scoping meetings.** The agency has the option of conducting formal meetings with the public to determine what should be included in the environmental impact statement.
- **Publication of a draft for comment.** The agency must release a draft environmental impact statement for public comment.
- **Meeting for comments on the draft.** During the comment period, the agency usually holds public meetings to collect comments on the draft environmental impact statement.
- **Publication of final environmental impact statement.** The agency revises the statement based on comments. A discussion of how the comments were used must be included in the environmental impact statement or as a supplement. Another comment period may follow the issuance of the final environmental impact statement, but usually no additional meetings are held.
- **Publication of a record of decision.** The agency publishes a short statement describing its final decision on the action. The record of decision may be posted in the *Federal Register*, mailed to those who commented, and/or placed in a public reading room or online.

The Council on Environmental Quality issues regulations as to the content and size of environmental impact statements (Council on Environmental Quality n.d.; 40 CFR 1500).

NATURAL RESOURCE DAMAGE ASSESSMENT

A Natural Resource Damage Assessment is the process of determining environmental damage caused by releases of hazardous substances. This process is part of

CERCLA. The process determines the condition of a specific part of the environment (including land, fish, wildlife, plants, air, water, groundwater, and drinking water supplies) that is public property (held by federal, state, local, or Native American governments). Natural Resource Trustees (state or federal agencies or Native American nations who act on behalf of the public for these resources) begin the process with a preassessment screen—a review of existing data concerning the resource—to determine whether hazardous substances have been released in sufficient quantity or concentration to damage the resource, whether the resource was damaged, whether data are available or can be obtained to conduct a full assessment, and how quickly the resource can be restored to its original condition. If the preassessment screen shows that the resource has likely been damaged, an independent organization is usually hired to prepare an assessment plan, more rigorously assess the damage (by studying the resource directly), and report to the trustees. If the trustees find that the resource has been detrimentally changed (chemically, physically, or in its viability as a natural resource; legally called injury), the organization or individual responsible for the injury may have to make restitution to them for loss of use of the resource, the cost to assess the injury, and the cost to restore the resource to its original condition (this money is legally called the damage). The public can also sue the trustees for failing to live up to their responsibilities.

Risk communication, although not mandated specifically for these assessments, can be extremely useful in developing the assessment plan, preparing the final report, and educating the trustees and the public on the potential risks and damages to the resource and the process of assessing those risks and damages.

OCCUPATIONAL SAFETY AND HEALTH ACT

The Occupational Safety and Health Act was passed to ensure that "no employee will suffer material impairment of health or functional capacity" as a result of working at a particular occupation. One provision of the act set up the Occupational Safety and Health Administration (OSHA), which oversees compliance with the other provisions. One of OSHA's duties is to set standards for the limits of exposure to potentially hazardous chemicals and other occupational exposures. A number of public involvement activities surround the setting of standards, but, because these activities are conducted only by OSHA, they are not discussed here. Instead, we focus on the communication requirements placed on the organizations employing workers.

OSHA has issued regulations in 29 CFR 1910.1200 (referred to as the Hazard Communication Standard or Hazcom; OSHA n.d.) that require employers to explain chemical and physical risks in

Occupational Safety and Health Administration has issued regulations in 29 CFR 1910.1200 that require employers to explain chemical and physical risks to workers.

the work environment to workers. These regulations are the origin for the use of Safety Data Sheets (SDSs), which are generally one- or two-page documents that explain the properties and risks of various chemicals and mitigation measures to prevent injury. The SDSs are prepared by organizations that manufacture, import, or sell the chemical or combination of chemicals. Over 500,000 products have these sheets.

OSHA provides detailed guidance on the information captured on these sheets, including:

- Specific chemical identity of the hazardous chemicals involved
- Common names for the chemicals
- Physical and chemical characteristics
- Known acute and chronic health effects and related health information
- Exposure limits
- Whether the chemical can be considered a carcinogen
- Precautionary measures for effective use
- Emergency and first aid procedures
- Identification (name, address, and telephone number) for the organization responsible for preparing the sheet

ANSI Standard No. Z400.1, *Hazardous Workplace Chemicals—Hazard Evaluation and Safety Data Sheet and Precautionary Labeling Preparation*, or OSHA Brief 3514 (ANSI 2010; OSHA 2012), can be used as guides to complete the 16 sections required in such sheets. Several commercial firms also sell software to help the user develop these sheets. Under the Occupational Safety and Health Act, the sheets must be made available to workers who could come in contact with the chemical described.

Specific chemicals are subject to additional regulations, some of which stipulate the training of workers in the use of the chemical. The training must include information on the risks, how to prevent possible exposure to the chemical, and what to do if exposed. Additional information, such as the SDSs, must also be made available.

In 2012, OSHA modified its hazard communication policies and practices to align with the Globally Harmonized System of Classification and Labeling of Chemicals, which is being adopted by countries in the United Nations. This system includes criteria for the classification of health, environmental and physical hazards, and it specifies what information must be included on labels of hazardous chemicals, pictograms, and SDSs. OSHA has published comprehensive guidance online at https://www.osha.gov/dsg/hazcom/index.html.

All federal agencies have been given authority to administer the OSHA regulations in their areas. In addition, state agencies can administer their own program if it is approved by OSHA. The state programs must be at least as stringent as the federal program and are usually more stringent. Check with your organization and state agencies to determine which programs apply to your risk communication effort and be sure that you have the latest versions of OSHA's requirements.

RESOURCE CONSERVATION AND RECOVERY ACT

This act establishes regulatory standards for the generation, transportation, storage, treatment, and disposal of hazardous waste. Public involvement in this process is encouraged by the act, but not specified to the extent that it is in the Superfund legislation. Instead, the act discusses ways for the public to take organizations that do not comply to court. To forestall such litigation, many agencies and organizations have developed their own requirements for risk communication and public involvement. Check with your state and local governments, your organization, and regulatory agencies involved before beginning your risk communication efforts.

RISK MANAGEMENT PLAN RULE

Under the Clean Air Act Amendments of 1990, the U.S. Environmental Protection Agency, in 1996, issued this rule, which requires facilities that use, make, or store toxic or flammable substances to develop a Risk Management Plan and submit it to the agency for public release. These plans contain hazard assessments with potential effects of an accidental release, a list of accidents in the last 5 years, and details on worst-case (the most drastic accident that can be envisioned for a facility) and alternative (more likely) accidental release scenarios. They also describe the accident prevention and emergency response programs. These plans must be updated at least every 5 years.

The plans have proven a benefit to communities trying to determine potential local hazards, and it provides greater incentive for organizations to find ways to communicate risks effectively, as the availability of the information could raise additional questions about local risks.

PRIVACY RULE

The Health Insurance Portability and Accountability Act of 1996 included a provision directing the U.S. Department of Health and Human Services to develop national standards for electronic health care transactions and the security and privacy of health information. The Privacy Rule, signed in April 2001, outlines administrative steps, policies, and procedures to safeguard individuals' personal, private health information, in electronic or other form, including oral communications.

If the risk about which you are communicating must be addressed using private health information, you will want to review the Privacy Rule, your state's interpretation or similar regulations, and your organization's policies in this area.

Although this regulation does not mandate risk communication per se, it has affected risk communication in certain cases, particularly where organizations are rigorous in implementing the regulation. Developing strategies to combat certain communicable diseases can be difficult if agency staff refuse to share individual information with the mistaken idea that they will be liable for legal action should they do otherwise. If the risk about which you are communicating must be addressed using private health information, you will want to review this regulation, your state's interpretation or similar regulations, and your organization's policies in this area.

OTHER GOVERNMENT INDUCEMENTS

Besides laws, government agencies, private organizations, and professional organizations can encourage risk communication activities by issuing standards, agreements, or funds in the form of grants.

Besides laws, government agencies and sometimes private organizations can encourage risk communication activities by issuing funds in the form of grants.

International Standards, Guidance, and Agreements

Several international agencies and organizations have issued guidelines, standards, or agreements that can influence risk communication efforts whether in the United States or abroad. For example, in 2010, the European Union published risk assessment and mapping guidelines for disaster management. The International Atomic Energy Agency has also developed a visual guide for communicating about nuclear disasters (IAEA 1990). The Sendai Framework of the United Nations Office for Disaster Risk Reduction lays out a number of goals and priorities, among which is one to substantially increase the availability of and access to multihazard early warning systems and disaster risk information and assessments to people by 2030. One of the initiatives under this framework has been to educate members of the news media worldwide on their role in risk communication (Leoni 2015). The World Health Organization routinely issues risk communication guidance on emerging health issues such as the Zika virus (WHO 2016).

In addition, the International Organization for Standardization (ISO) has issued several standards related to risk communication. Government agencies and private companies around the world apply these standards to their activities.

Some industries consider it a competitive advantage to be ISO-compliant. For example, a study of 63 Brazilian companies in the chemical, mechanical, and electronics industries found that one of the four factors in pursuing compliance with ISO environmental management standards had to do with the belief that business would improve as a result (Gavronski et al. 2008).

One of the more far-reaching sets of standards related to risk communication is the ISO 14000 series, which addresses environmental management, including what an organization does to minimize harmful effects it may cause on the environment and continually improve its environmental performance. ISO 14001, first published in 1996 and updated in 2015, describes an organization's approach to developing, maintaining, and evaluating an environmental management system.

ISO 14020 (2000) provides specific tools and guidance related to product labeling and declarations. ISO 14063 (2006) offers additional guidance on communicating environmental information, including risks. Although the standard supports ISO 14001, it can be used in situations in which the organization has no formal environmental management system. This standard discusses principles of environmental communication; development of an environmental policy and strategy; and planning, implementation, and evaluation of environmental communication activities. Although some of the activities (for example, publication of environmental reports with no opportunity for feedback) focus on one-way communication that should not be considered effective risk communication, other guidance is especially useful on developing risk communication programs, whether care, consensus, or crisis communication.

In 2009, ISO issued the 31000 series, which addresses a general approach to risk management, applicable to many industries. Part of that standard describes the development of an external communication plan to share information with stakeholders. Again, the focus appears to be more on one-way communication, which can debilitate true risk communication.

Check with your organization to determine which guidelines and standards may apply before beginning risk communication efforts and consider going beyond standards that advocate one-way communication.

North American Standards

Other organizations issue standards related to risk communication, particularly in areas of emergency management. The American National Standards Institute, American Society for Testing and Materials, National Council on Radiation Protection and Measurements, and National Fire Protection Association, among others, have developed guides and standards for emergency response. For example, ASTM E2541, *Standard Guide for Stakeholder-Focused, Consensus-Based Disaster Restoration Process for Contaminated Assets* (ASTM 2007), provides a framework to involve stakeholders in the decision-making process when a natural disaster or terrorist attack damages infrastructure (consensus communication). Many of these standards focus on technical aspects such as the assessment of damages, with communication added as a second thought. In some cases, recommendations for good communication practices are a bit dated. However, if your risk communication efforts cover emergency response, check to see if these guides and standards apply, and remember that it is always possible, and often advisable, to improve on the standard.

Grants

When $10 million in grant funding is riding on the development of a risk communication plan, that plan will most likely get written. One example of this tactic is the Public Health Preparedness funding from the U.S. Centers for Disease Control and Prevention (CDC). Each state was allocated a certain amount of money to plan for responding to a public health emergency such as a bioterrorist attack or major disease outbreak, but the money came with the requirement of a grant application that was more of a project plan, divided into areas of focus. Focus Area F constituted risk communication activities, among them a plan on how to communicate during a public health emergency.

To aid states developing such plans, CDC developed a comprehensive training program called CDCynergy, Emergency and Risk Communication, which has since grown to a comprehensive program offering text, examples, and training to public health practitioners. The materials for this program were developed by experts in risk communication, particularly crisis communication, and included videos on specific topics, examples of plans and procedures, and in-depth information on working with the news media and public.

See the agency website at https://emergency.cdc.gov/cerc/index.asp http://www.cdc.gov/healthcommunication/CDCynergy/ for more information.

SUMMARY

Various laws and regulations can apply to risk communication efforts. Check with federal agencies, state agencies, local governments, national and international standards organizations, and your own organization before beginning a risk communication effort to ensure that you understand and comply with the requirements.

REFERENCES

American National Standards Institute (ANSI). 2010. Hazardous Workplace Chemicals – Hazard Evaluation and Safety Data Sheet and Precautionary Labeling Preparation. ANSI Standard Z400.1, Washington, DC.

American Society for Testing and Materials (ASTM). 2007. Standard Guide for Stakeholder-Focused, Consensus-Based Disaster Restoration Process for Contaminated Assets. ASTM e2541, ASTM, West Conshohocken, Pennsylvania.

Bullard, R. D. 1990. “In Our Backyards: Minority Communities Get Most of the Dumps.” *EPA Journal*, 18 (1): 11–12.

Council on Environmental Quality. n.d. 40 CFR (Code of Federal Regulations) Parts 1500 to 1508. “National Environmental Policy Act Implementing Regulations.” Office of the Federal Register, National Archives and Records Administration, Washington, DC.

Gavronski, I., G. Ferrer, and E. Laureano Paiva. 2008. “ISO 14001 Certification in Brazil: Motivations and Benefits.” *Journal of Cleaner Production*, 16 (1): 87–94.

IAEA (International Atomic Energy Agency). 1990. “International Nuclear and Radiological Event Scale.” http://www-ns.iaea.org/tech-areas/emergency/ines.asp (accessed July 31, 2017).

Leoni, B. 2015. “Georgian Media Talk Disaster Risk.” Prevention Web, United Nations Office for Disaster Risk Reduction, http://www.preventionweb.net/news/view/46596 (accessed July 31, 2017).

OSHA (Occupational Safety and Health Administration). n.d. 29 CFR (Code of Federal Regulations) Part 1910.1200. “Hazard Communication.” Office of the Federal Register, National Archives and Records Administration, Washington, DC.

OSHA (Occupational Safety and Health Administration). 2012. Hazard Communication Standard: Safety Data Sheets. OSHA Brief 3514, https://www.osha.gov/Publications/OSHA3514.html (accessed July 31, 2017).

WHO (World Health Organization). 2016. “Risk Communication in the Context of Zika Virus: Interim Guidance.” http://apps.who.int/iris/bitstream/10665/204513/1/WHO_ZIKV_RCCE_16.1_eng.pdf?ua=1 (accessed October 15, 2017).

ADDITIONAL RESOURCES

Baram, M. S. and P. Kenyon. 1986. “Risk Communication and the Law for Chronic Health and Environmental Hazards.” *Environmental Professional*, 8 (2): 165–179.

Carson, J. E. 1992. “On the Preparation of Environmental Impact Statements in the United States of America.” *Atmospheric Environment*, 26 (15): 2759–2769.

EPA (U.S. Environmental Protection Agency). 1989. Facts about the National Environmental Policy Act. U.S. Environmental Protection Agency, Enforcement and Compliance Monitoring, Washington, DC.

Hadden, S. G. 1990. *A Citizen’s Right to Know: Risk Communication and Public Policy*. Westview Press, Boulder, Colorado.

International Organization for Standardization http://www.iso.org/iso/home.html (accessed October 15, 2017).

Jia, C. Q., A. diGuardo, and D. Mackay. 1996. “Toxic Release Inventories: Opportunities for Improved Presentation and Interpretation.” *Environmental Science and Technology*, 30 (2): A86–A91.

World Health Organization. International Health Regulations. http://www.who.int/ihr/en/ (accessed July 31, 2017).

4

CONSTRAINTS TO EFFECTIVE RISK COMMUNICATION

Many factors can place limitations on the risk communication effort. In general, the same factors can limit or constrain care, consensus, and crisis communication. Those who are communicating risk need to be aware of these constraints so that they can recognize and overcome the problems to increase their chances of communicating effectively. This chapter discusses the constraints on risk communicators as well as the constraints that come from the audience, offering advice on how to recognize and overcome potential problems.

CONSTRAINTS ON THE COMMUNICATOR

Suppose you are faced with a particularly difficult assignment—explain to a group of mothers that their infants have been inadvertently exposed to a highly toxic chemical that may cause mental retardation, physical disabilities, or even death. You can justifiably expect anger and fear, with people yelling and crying, not to mention the likelihood of lawsuits that could close your organization permanently. You plunge into the task, only to find that these difficulties in

---

Risk Communication: A Handbook for Communicating Environmental, Safety, and Health Risks, Sixth Edition. Regina E. Lundgren and Andrea H. McMakin.
© 2018 The Institute of Electrical and Electronics Engineers, Inc., and Regina E. Lundgren and Andrea H. McMakin. Published 2018 by John Wiley & Sons, Inc.

communicating this risk information are the least of your worries. What could make them worse? Read on.

Organizational Constraints

The very organization that has asked you to communicate risks can put any number of roadblocks in your way:

- Inadequate resources
- Management apathy or hostility
- Potential roles dichotomy
- Difficult review and approval procedures
- Corporate protection requirements
- Conflicting organizational requirements
- Insufficient information to adequately plan and set schedules

Inadequate Resources

To effectively communicate risk, you need the funding, staff, equipment, and space to do the job. Unfortunately, in many organizations, the technical aspects of the risk (the risk assessment and risk management) are given the bulk of these key resources. Many organizations that would never refuse a scientist software to calculate dose quite easily turn down a requisition for software that would make it easier and less expensive to create and revise risk messages that are far more readable for the intended audience. With so much attention paid to the analysis of risk, the actual communication can be completely forgotten.

The challenge of finding adequate resources for effective risk communication has only been exacerbated in recent years. Government agencies have cut back on all but essential services; private industry is trying to do more with less. Couple this trend with the increased number of communication methods (Internet and social media in particular), staffing resources are quickly overwhelmed, even in care communication.

The empirical data show how risk communication plays an important part in the risk management process. For example, the *Washington Post* reported in October 2003 that utilities were coming to realize the importance of communicating risk management decisions to their constituencies. One utility took the brunt of public outcry when it failed to provide prompt and reliable estimates of when power would be restored after a devastating hurricane. Concerns escalated to the political level, damaging company credibility and exposing the organization to Congressional inquiry (Davenport 2003).

Those of us who are developing risk communication programs based on laws or other regulations can point to these laws, which mandate involving the audience in how the risk is managed and, therefore, require risk communication. Organizations ignore or neglect these requirements at their own peril. Likewise, when the entire charter of the organization is based on communicating risks, it may not be hard to argue for adequate resources. In the absence of such legal or organizational mandates, those who are communicating risk in more voluntary programs can use case studies and examples of programs that succeeded or failed and how these affected the organization's ability to do business (for example, see Beierle 2002; Hunt and Monaghan 1992; Sanderson and Niles 1992).

In addition, resources of staff and funding can be augmented through partnering. Both government agencies and industry can look to nonprofit organizations and volunteer groups for support where risk interests and organizational cultures align. For example, a large church in Seattle, Washington, offered to supply volunteers to local emergency management agencies to update online social media properties during emergencies. High school and college students may also be willing to trade free hours for work experience or community support. For more information on partnering, see Chapter 20.

Management Apathy or Hostility

Even when resources are plentiful, risk communication efforts may still fail because of the lack of support by the organization's managers or other decision makers. This support is necessary to obtain resources; to conduct many of the activities required in care, consensus, and crisis communication; and to evaluate and improve risk communication efforts. Balch and Sutton (1995), Boiarsky (1991), and Dozier et al. (1995) have pointed out that those who are communicating risk must first reach this internal audience before reaching out to an external audience. Only when the managers support a risk communication effort can that effort succeed.

Sometimes, this lack of support may arise from apparent apathy. As in the case of having insufficient resources, with the risk assessment and resulting decision taking the spotlight (often justifiably), managers and other decision makers seem to find it easy to overlook the risk communication effort. Educating managers on the effects poor communication can have on an organization will sometimes be enough to alert them to the need to support your efforts.

> Educating managers on the effects that poor communication can have on an organization will sometimes be enough to alert them to the need to support your efforts.

For example, when the government and beef industry of the United Kingdom ignored both scientific evidence and good risk communication practices during the mad cow outbreak in the 1990s, the costs to subsidize the failing beef industry throughout the European Union and to cull the British herd exceeded $5 billion (Leiss and Powell 2005). In addition, when Jack in the Box Restaurants fumbled their risk communication efforts and were blamed for the death of three children and the hospitalization of 144 customers, stock values plummeted 43% and the company posted a $44 million loss for the year, compared with a $22 million profit the previous year (Henry 2000).

Sometimes, however, the lack of support for risk communication efforts comes from an apparent hostility to the process. Caron Chess, Director of Rutgers University's Center for Environmental Communication, in a presentation at the 1994 Society for Risk Analysis Annual Meeting, described a phenomenon called the "Threat Rigidity Response." Simply put, this is how managers of an organization may react when they feel threatened. This feeling can arise from such situations as the threat of a lawsuit, the perceived potential for negative publicity, or the perceived lack of control of the situation. When so threatened, the managers of an organization become more rigid and more controlling. They tighten controls on their staff, the flow of information, and the decision-making process. This kind of rigid response can make successful risk communication virtually impossible.

Chess found that organizations with certain characteristics are more successful at avoiding this rigid response to a perceived threat and, hence, are more successful at communicating risk. These characteristics include the following:

- The organization has a mechanism for the upward flow of information.
- The organization has a diffraction of responsibility (communication is everyone's business as opposed to being within the sole purview of a public affairs function).
- The organization has a permeable boundary—there are numerous ways for the community (or audience) to get information about the organization's activities.

In addition, studies of communication organizations by David Dozier and Larissa and James Grunig of the University of Maryland found that communication effectiveness or excellence was heavily influenced by shared expectations between senior management and those charged with communicating for the organization. Other factors included the core knowledge of the communicators and the level of participation allowed by corporate culture. The more knowledgeable the communicator in communication tactics and strategy, and the more participatory the culture, the better was the chance of effective communication (Dozier et al. 1995).

When the Risk Communication Advisory Committee of the U.S. Food and Drug Administration was asked to review the organization's strategic plan, they also offered recommendations for organizational effectiveness. One recommendation was to develop an organizational structure that ensures the recruitment, retention, and integration of individuals with the needed expertise in risk communication. Another was to develop a workflow system to ensure that communications are integrated into operations, with communicators and other subject matter experts teaming to create, summarize, refine, and deliver the needed information evaluated to a scientific standard (FDA 2009). In addition, the research by the Environmental Agency of the United Kingdom found that if risk communication is not embedded in the organization, it will not be perpetuated beyond certain individuals (UK EA n.d.).

On a routine basis, those who are communicating risk can encourage these types of behaviors and philosophies within their organizations so that hostility to risk communication efforts is less likely to occur. Dozier's work suggests that sometimes "crises" such as mergers, change in leadership, new competition, new markets, and new projects open opportunities to convince management to support risk communication activities (Dozier et al. 1995). If hostility does occur, those who are communicating risk can view their management as a hostile audience and use some of the techniques described later in this chapter to deal effectively with such audiences. See also Chapter 5 for more information on satisfying the needs of managers.

Potential Roles Dichotomy

Another constraint that the organization can place on those communicating risk is the role the organization is willing to play in the risk communication process. The organization's perception of this role may come from laws and regulations, community expectations, or corporate policy. Table 4.1 summarizes some of the most common roles organizations can play.

Often, those in care communication situations find themselves in the educator role—trying to provide information to explain a risk so that people will take appropriate steps to protect themselves. In consensus communication, organizations may play the role of facilitator or partner, working with stakeholders to develop an appropriate risk management approach. In crisis communications, organizations may serve as managers, telling audiences exactly what must be done to stop a risk from escalating. After the crisis, other organizations may act as regulators to ensure that future crises are avoided.

Risk communication efforts are constrained when the audience expects a different role from the one the organization is willing to play. For example, if the audience is expecting the organization to partner with them in developing a risk management approach, but the organization attempts to fill a manager role by telling the audience what must be done, both the organization's credibility and its ability to communicate effectively will suffer. When presented with a roles dichotomy, audiences often react with anger, hostility, and a general unwillingness to help manage the risk.

Table 4.1. Example Organizational Roles in Risk Communication

Role	Expectation	Authority
Educator	Explain and inform	To impart knowledge
Facilitator	Encourage and support	To point toward solutions
Partner	Work with others	To jointly solve problems
Manager	Tell them what to do	To prevent or mitigate the risk
Regulator	Mete out justice	To enforce decisions

For example, a distraught mother called a local agency charged with communicating about air quality issues. A contractor had just finished remediating her home for asbestos in the ceiling. The mother wanted assurances from the agency that it was safe for her child to return to the home. The agency representative explained the potential risks of asbestos and advised her to talk to her contractor to see what had been done to remediate them.

When presented with a roles dichotomy, audiences often react with anger, hostility, and general unwillingness to help manage the risk.

"You sound like a mother," the woman protested. "What would you do? Would you let your child back in the house?"

In this case, the caller wanted to give the agency representative the role of friend and confidante. Perhaps motivated by anxiety, she might have been trying to put a human face on what she perceived as a bureaucracy. But the agency's role was to inform and educate, not facilitate or regulate. Providing advice as a "mother" could even have resulted in legal action later. The lesson: stay within your role. The representative could have responded something like this:

> I am a mother, but I don't think you called me because of that. I think you may have called because you were hoping my organization had information that could help you. Let me make sure I understand what information you're looking for and then I'll try to help you get the answers you need.

One of the best ways to manage this constraint is to identify the organization's role before the risk communication process starts. Know what your organization expects of you and communicate this consistently to your audiences every time. We sometimes recommend that agency representatives who answer public information lines identify their role in the first few seconds of the conversation. You can do this by using your position title if it communicates what you do to those outside the agency. If it does not, you can add an explanatory phrase when introducing yourself. For written materials, include a sentence on the responsibilities of your organization early on to set expectations.

One of the best ways to manage a roles dichotomy is to identify the organization's role before the risk communication process starts.

For additional information on developing materials, see Chapter 13. For more information on being a credible spokesperson, see Chapter 15.

Difficult Review and Approval Procedures

Another way an organization can constrain the communication of risk is by requiring review and approval procedures that are either inappropriate or too time-consuming. A good example comes from one of the national laboratories.

The laboratory had a detailed review and approval procedure for the release of all technical information. This procedure required no less than nine reviews and signatures, as well as review and approval by the U.S. Department of Energy, which funded the laboratory's work. The system was designed to ensure that preliminary technical information generated in innovative research and development activities was not released prematurely. However, the laboratory was asked to act as an independent agency to determine what past doses the public may have received from radioactive releases from a U.S. Department of Energy facility. To maintain its independence in the eyes of its audience, the laboratory needed to be able to release information, sometimes even preliminary data, as quickly as possible. It also needed to distance itself from the U.S. Department of Energy, which many members of the audience did not trust to produce unbiased results. Recognizing these problems, the laboratory tailored its internal review process (fewer signatures required and no U.S. Department of Energy approval) to allow risk to be communicated effectively for that audience.

To show managers and decision makers that changes are necessary, a complete audience and situation analysis may be all that is required, especially if the audience has already threatened legal action. What reviews does the organization feel are absolutely necessary? Can any be combined? Who does the audience view as credible to review the information? Is this a crisis situation or one in which the audience is particularly hostile? In either of these cases, information will need to be released as quickly as possible. Showing that the audience and the organization's interests are best served by changes and suggesting easy ways to accomplish those changes can result in review and approval procedures that are more appropriate and timely.

Showing that the audience and the organization's interests are best served by changes and suggesting easy ways to accomplish those changes can result in review and approval procedures that are more appropriate and timely.

Corporate Protection Requirements

Review and approval procedures are only one way an organization seeks to protect itself. Private companies, in particular, can view information as a competitive advantage. Even if some risk information is provided, other information may be closely guarded for the fear of releasing sensitive data that could clue competitors in to company trade secrets.

Since the terror attacks in the United States in 2001, organizations have additional concerns about protecting information. Information on where hazardous materials are stored and in what quantities could be used by those with criminal or terrorist intent. Yet it is often this information that is the key to understanding risk in communities.

But corporations are not the only organizations to be concerned about the release of risk information. Government agencies sometimes hesitate to share information because of misplaced optimism or fear of public reaction. For example, during the mad cow disease outbreak in 2000 in Europe, Germany's agriculture minister, hoping to protect the beef market, boldly proclaimed that the country was immune. Germany's regulations would prevent contaminated material from being fed to cattle. One week later, the first sick cow was discovered, and beef sales plummeted. Japan experienced the same pattern in 2001 when its agriculture minister promised no more victims after the first sick cow was found, and two more were found only 2 days later (Green et al. 2007).

Risk communicators must carefully consider what information can be released and look for ways to reach satisfactory compromises. As memories of dangers fade, the public will be less willing to allow companies to protect information in the name of security. For additional information on deciding what information can be released, see Chapter 5. For more information on choosing appropriate communication mechanisms, see Chapter 10.

Risk communicators must carefully consider what information can be released and look for ways to reach satisfactory compromises. As memories of dangers fade, the public will be less willing to allow companies to protect information in the name of security.

Conflicting Organizational Requirements

Yet another way an organization can constrain those who are communicating risk is by having policies, however well-intentioned, that conflict with the goals of risk communication. For example, a research and development firm had a standing policy that any information given to the public regarding the organization had to be approved of and released by public affairs representatives. Unfortunately, the public affairs staff had the charter for safeguarding the company's reputation and felt that to fulfill this charter they would allow nothing but completely positive information to be released. When risk communicators wanted to add information about the firm to an environmental impact statement, which analyzed both the negative and the positive aspects of a risk, the public affairs staff responded, "I just can't let you say that." (This type of response is one reason why public affairs staff can be mistrusted by some members of the audience.) However, communicating risk often requires that some of the worst information about an organization be released.

Before any risk communication project begins, those who are communicating the risk should review organizational requirements to see which will conflict and discuss the potential problems with the staff responsible for implementing the requirements. A little planning and explanation of the purposes of risk communication can help avoid a problem.

Insufficient Information to Adequately Plan and Set Schedules

As discussed in Part II, a wealth of information is necessary to create a communication plan and set a schedule. In some organizations, this information is closely guarded. Other organizations seem to simply ignore the planning process. After diligently searching, those who are communicating risk may develop schedules based on inadequate or what turns out to be incorrect information, only to find that their schedules cannot be met. For example, suppose your risk communication effort is scheduled to begin after a risk assessment is finished on October 1, with fact sheets to be issued and public meetings to be held shortly thereafter. Notices of where and when the meetings will be held have already been published. However, unbeknownst to you, the risk assessment has been delayed and will not be finished until November 1. You will have to retract your notices and replan.

Unfortunately, members of your audience may conclude that this is some kind of delaying tactic and that your organization does not want to release the information. When you finally do get the chance to begin communicating the risk, your credibility will already have suffered.

Plans and schedules that are both realistic and flexible must be developed to effectively communicate risk. Some factors to consider include legal requirements, organizational requirements, the scientific process, ongoing activities within the organization and nation, and audience needs. More specific information to be considered in developing schedules is discussed in Chapter 11.

Emotional Constraints

Another type of constraint on those who communicate risk comes from within themselves. Emotions and beliefs can color our attempts to communicate. The three emotional constraints most difficult to overcome are unwillingness to see the public as equal partner in risk decisions, inability to see how stakeholder value systems differ from our own, and the belief that science can never be understood by the public.

Unwillingness to See the Public as an Equal Partner

In a logical world, many feel, decisions about how to manage a risk would be made by those who really understood the situation. Furthermore, such decisions would be based on scientific principles, economic realities, and logic, not emotions, beliefs, and political leanings. Risk communication, however, cannot be effective unless it considers the emotions, beliefs, and political leanings of the audience.

Working with decision makers who show this unwillingness can be difficult. Remind them of their goal: to make a decision that will stand the test of time. As a number of court cases have shown, such a decision can only be reached when all parties agree with it, at least to some extent. It does the organization no good to decide on a perfectly logical, scientifically based, economical strategy, only to be tied up in court for years trying to justify it to people who would likely have accepted it in the first place if they had only been consulted!

Overcoming this belief in yourself can be even more difficult. If you find yourself resisting reaching out to those you know are concerned or whom others have suggested should be contacted, ask yourself why. Is it because of the difficulty involved in developing the contacts, or do you feel that the contacts should not be made at all? Remind yourself that a number of success stories and research (such as Arvai 2003; Beierle 2002; Hunt and Monaghan 1992; Sanderson and Niles 1992) have shown that making reasonable attempts to consult interested stakeholders results in better, more useful, and more lasting solutions.

Inability to See Differing Value Systems

Everyone has a value system, a method by which they evaluate and choose between alternatives in a given situation. Often, our values are so deeply ingrained that it is difficult to recognize them for what they are. It is even more difficult to recognize that these values differ from the value systems of others. It seems to be a very human tendency to think that everyone else sees things the same way we do. For example, when U.S. and European agencies tried to stop the rise of HIV/AIDS in Namibia with a campaign that featured messages on abstinence and monogamy, the effort flopped. The Namibian culture placed a different value on sexual relations and, in fact, encouraged polygamist relationships (Hillier 2006).

Value systems play a large role in how any member of the audience views a risk. When constructing risk messages, it is easy to focus attention on matters that we feel are important, without thinking through what issues are of importance to the intended audience. To guard against our own biases in framing risk communication messages, those of us who are communicating risk must understand the audience thoroughly. Terryn Barill, a risk communication consultant, recommends interviewing members of the audience and listening to not only the questions they ask but also the words they use, to help you determine what is most important to them and to then include that information in the risk message (Barill 1991). The techniques in Chapter 8 are also designed to help.

Belief that the Public Cannot Understand Science

Many experts who have devoted years to a field of study feel that the public cannot possibly understand scientific or technical information. As one expert stated when asked for a definition of a term used to present risk, "I have a Ph.D. and I've been studying that for 15 years; I can't possibly explain it to you." When this topic was introduced at a lecture at a university, a professor in the audience asked with great skepticism, "Do you honestly believe that you can explain anything to the general public?" Our answer was, and is, a resounding "Yes!"

The Chinese government learned the importance of this belief. During the severe acute respiratory syndrome (SARS) outbreak in 2002/2003, provincial leaders withheld information about the spread of the disease and plans to contain it because they felt that their citizens were not educated enough to understand it. But when the villagers learned that their area might be used as a quarantine station, they panicked. The lack of information led them to riot and block roads to keep strangers away (Green et al. 2007).

> The principal obstacles to understanding are lay [peoples'] time and attention, not intelligence.
> —Granger Morgan et al. (2002, p. 8)

Like risk communicators all over the world, we have spent our careers explaining scientific information to nontechnical audiences—how a nuclear reactor works, how hydrocarbon contamination can "float" on aquifers, and what a risk of 10^{-6} means. Presenting each piece of information was a challenge, requiring that we knew our audience and had a good command of language. We often had to borrow or develop innovative ways to present the information. But that just proves that it can be done. The techniques described later in Part III are designed to help you present risk information in a variety of ways.

CONSTRAINTS FROM THE AUDIENCE

Constraints do not just come from within those who are communicating risk or the organization. The audience itself often brings constraints that must be overcome if risks are to be communicated. These constraints include cultural alignment, hostility and outrage, panic and denial, apathy, mistrust of risk assessment, disagreements on the acceptable magnitude of risk, lack of faith in science and institutions, and learning difficulties.

Cultural Alignment

Many a parent has complained about the "group think" that sometimes infects teens, leading to risky behavior such as underage drinking or substance abuse. Research is beginning to show, however, that people in general are prone to align their risk perceptions to what they believe are group norms, especially characteristics that distinguish the group from others. For example, if your friends and colleagues all smoke cigarettes as part of an industry in which the habit is common, you may be more likely to take up the habit yourself. Those who identify with environmental justice norms may be more likely to embrace the next cause. The idea, as explained by the Yale Law School's Cultural Cognition Project, is that people are acting to prevent conflict and protect their ties to the group (Kaplan 2013).

The lesson for risk communicators is to fully understand your audience. What groups do they embrace? What values do they hold dear? Can you partner with group leaders to encourage changes in care communication? Can you involve the entire group in consensus communication? Can you offer messages that align with group norms in a crisis? For more information on understanding your audience, see Chapter 8.

Hostility and Outrage

Many audiences react with hostility toward risk messages. By hostility, we mean anxiety, anger, frustration, and contempt. This can be true in care and crisis communication efforts; however, it seems to particularly plague consensus communication efforts. Peter Sandman, among others, has presented factors that may affect the audience's hostility level. As mentioned in Chapter 2, in the discussion of the Hazard Plus Outrage Approach, he sees risk as having two components: hazard, or the scientific aspect of the actual danger, and outrage, or the audience's other concerns about the danger. Factors that influence the level of outrage include the voluntariness of the risk (do they have a choice?), level of dread (how scary is it?), issue of fairness (do they see it as being fair?), and the moral relevance (the more relevant it is to their morality, the more hostile they become).

In addition to Sandman's outrage factors, there are other reasons that the audience may be hostile (Table 4.2), reasons that have nothing to do with the risk itself. Those who are communicating risk need to be aware of these issues because the higher the level of hostility, the less chance that the audience will hear the risk message, and the less chance that any real communication will take place.

One reason an audience may be hostile is that the organization communicating the risk is seen as not being credible. This was the situation for the U.S. Environmental Protection Agency during the Reagan Administration. The agency was viewed by many as being more often on the side of the polluter than on the side of the environment; hence, anything agency officials said was viewed with great suspicion. Those who are communicating risk may not be able to do much once credibility has been lost, except to recognize it and try to keep future risk communication efforts as credible as possible. The trust between organization and audience can be rebuilt slowly if the relationship is built on trustworthy efforts.

Another reason for audience hostility has to do with the message being viewed as too positive. Most audiences react with hostility if they feel that they are merely being placated and if the message is full of trite phrases or facile reassurances, especially in the face of negative information in the press. They do not want to hear, "Trust us; everything is fine." They will often only be satisfied if they or someone they trust has reviewed all the data and reached the same conclusion.

> Audiences may react with hostility if the message is viewed as too positive. Most audiences react with hostility if they feel they are merely being placated or if the message is full of trite phrases or facile reassurances, especially in the face of negative information in the press.

Audiences can also be hostile if their concerns have been ignored. One of the

Table 4.2. Reasons the Audience Can Be Hostile

Factors	More hostility	Less hostility
Catastrophic potential	Grouped in time and space	Scattered in time and space
Level of familiarity	Uncommon	Very common
Level of understanding	Not well understood by science	Well understood by science
Level of personal control	Controlled by a distrusted individual	Controlled by the source
Voluntariness	Involuntary	Voluntary
Effects on children	More likely to affect children	Less likely to affect children
Moral relevance	Relevant	Not relevant
Timing of effects	Immediate effects	Delayed effects
Identity of victims	Closely related	Statistical victims
Level of dread	Greatly feared	Apathetic
Level of trust in institutions	Distrust	Trust
Amount of media attention	Highly popularized	Seldom mentioned
History of accidents	Well-known accidents	No accidents
Equity (fairness)	Viewed as unfair	Viewed as fair
Distribution of benefits	Benefits distributed unequally with risk	Benefits distributed equally with risk
Reversibility	Damage irreversible	Damage reversible
Personal stake	Strong	Weak
Origin	Artificial	Natural
Level of uncertainty	Unknown to science	Known to science
Tone of message	Too positive	Objective
Organizational attitude	Organization ignores	Organization seeks out concerns and acknowledges concerns
Degree of change in lifestyle	Sharp change from normal	Little change from normal
Degree of understanding of process/data	Process/data presentation too complex	Process/data presentation aimed at audience

Adapted from various works by Paul Slovic, Vincent T. Covello, and Peter Sandman; for example, Covello et al. (1988).

principles of risk communication is to listen and deal with specific concerns (see Chapter 6). Hance et al. (1988) cite the case of an office building that was contaminated with dioxin (a cancer-causing chemical) after a fire. Although the risk assessment showed the building to be safe for the employees to return to work, and this information was communicated to the employees, the hostility level continued to rise. It turned out that the employees' main concern was where to park. The parking garage had also been damaged, and parking was not available in the downtown area near the building. The employees were not willing to listen to the message that the workplace was safe and they could return to work until their concerns over parking were addressed. Thus, those who are communicating risk must make sure that risk messages address audience concerns, even if the concerns seem to relate to peripheral issues.

Another reason audiences can be hostile is the very human perception that change is bad. For example, in a case where the groundwater in a rural area had been contaminated by chemicals leaching from a landfill, the response from many area residents was, "My grandfather drank from this well, my father drank from this well, and I don't see why I can't." A possible way to overcome this type of attitude is to show not only the dangers of continuing risky behavior but also the benefits of changing behavior to something less risky. However, information alone does not generally lead to changes in behavior, as shown by some of the research related to the mental models approach to risk communication (see Chapter 2).

Another reason audiences can be hostile is that they do not understand either the process or the data being communicated. The information may be too technical (full of difficult concepts or laced with acronyms and jargon) or the presentation may not meet their needs (for example, a presentation in English for an audience whose primary language is Spanish). The obvious way to overcome this reason for hostility is to use language and a method that meet the needs of your audience. The information in Part III is designed to help.

Panic and Denial

Sometimes, the nature of the risk and the audience's situation raise an even deadlier response than hostility: panic and denial. Such cases are, we are thankful to say, rare. Panic is the extreme response to a combination of fear, dread, and a lack of perceived control. When audiences panic, it is because they perceive themselves or those they love to be in imminent, life-threatening danger that they cannot influence. Panic can stop all action to prevent a risk, effectively freezing a person, or lead to unproductive actions that can actually make the damage worse. Panic also tends to interfere with cognitive processing, as chemicals flood the brain, preventing risk communication messages from being heard and acted upon.

Panic is the extreme response to a combination of fear, dread, and a lack of perceived control. Beyond panic is denial, when the perceived result of a risk is so horrific that other coping mechanisms break down.

Beyond panic, however, is denial. Denial occurs when the perceived result of a risk is so horrific that other coping mechanisms break down. We cannot accept that something so awful has happened or could happen, so we simply refuse to think about it. An audience in denial is deceptively calm. Risk communication messages attempting to increase concern only push those at risk into a deeper denial. For example, during an Ebola outbreak in Liberia, lack of trust and a belief that they could not be carriers led people to take risky behaviors such as skipping quarantine and evading officials, spreading the disease (Giahyue and Farge 2015).

Panic and denial are beyond the skills of most risk communicators to manage. However, those who are communicating risk need to realize that denial and panic are one end of the response spectrum for risks. A thorough understanding of audience needs can help prevent the introduction of risk messages or use of mechanisms (such as a graphic picture or live footage) that could thrust an audience into this difficult psychological area. Chapter 8 provides additional information on understanding those with whom you are communicating.

Apathy

At times it seems that those who are communicating risk simply cannot succeed. Audiences faced with crises may panic. Audiences in consensus communication situations often exhibit hostility and outrage. Audiences in care communication (and to a lesser degree some crisis communication efforts) are often apathetic.

When an audience is apathetic toward a risk, it is often because what has been deemed a high risk by scientists and government agencies seems impossible or trivial to the audience in question. A good example is the early efforts of the U.S. Environmental Protection Agency to warn of the dangers of radon in homes. Despite a major risk communication effort, the intended audience still did not change to less risky behavior, in this case, testing their homes for radon. Only when risk communication researchers did a more thorough audience analysis, using the mental models approach discussed in Chapter 2, did the risk communication effort begin to show some success (Morgan et al. 1992).

Even those thoroughly familiar with the risk can grow apathetic. For example, in planning for pandemic influenza, the U.S. Occupational Safety and Health Administration found that health care workers refused to wash their hands, even though hand washing is cited as one of the most effective methods for stemming a pandemic. In general, people need to feel sufficient concern about the risk to take action, and risks that are familiar and perceived to be low are less likely to engender that concern (OSHA 2007).

When faced with apathy, those who are communicating risk need to conduct as thorough an audience analysis as time and other resources allow. Only by understanding the audience can we hope to identify matters of importance to them and then to link the risk communication efforts to those important issues. First consider, however, the ethical implications of manipulating your audience (see Chapter 5 for additional information).

When faced with apathy, those who are communicating risk need to conduct as thorough an audience analysis as time and other resources allow.

Mistrust of Risk Assessment

As mentioned in Chapter 1, risk communication efforts are built around a process that starts with a risk assessment and ends with a risk management decision and subsequent action. Unfortunately, a number of health, environmental, and civic organizations have in the past presented their opinions that any form of risk assessment is so seriously flawed as to prevent its use in all but the most specific of circumstances. Researcher Alon Tal of the Arawa Institute for Environmental Studies in Israel conducted a study of 17 national and 16 local environmental groups to determine their attitudes toward risk assessment. Over 75% of those surveyed felt that risk assessment was a disempowering process (undemocratic), led to regulatory delays, and was used as a ruse for deregulation. Another telling observation was that 58% felt that risk assessments are inescapably biased to underestimate risk, when most risk assessors would agree that assessments are grossly overconservative (Tal 1997).

Faced with such negative perceptions of risk assessment, what can those who are communicating risk hope to accomplish? The key appears to be in understanding what is driving the difficulties. For example, many environmental organizations in Tal's study felt that one of the major flaws in the risk assessment process was the characterization or definition of risk. One way to address this flaw is to involve the audience in the risk characterization process to identify the aspects of the risk to be studied and the study methods. Another area of concern was the ethical dimension of risk. According to Tal (1997), many environmental organizations felt that "risk assessment is fundamentally immoral, consigning people (and in some critiques, ecosystems) to intolerable environmental fates without their consent" (p. 473A). As noted earlier in this chapter, addressing the value systems of your audience can help in this case by adapting the process when possible. For example, risk assessors found a way to show via icons the various steps and assumptions in

Until these issues are addressed, environmentalists will remain extremely suspicious of risk numbers. Without enhanced scientific validity, they will oppose the growing influence of risk numbers over environmental health decisions. "Garbage in garbage out" is a frequently heard aphorism among interviewees.
—Alon Tal (1997, p. 473A)

the risk assessment process when the audience expressed concerns that risks were calculated by a "black box."

Disagreements on the Acceptable Magnitude of Risk

Scientists, regulators, and risk managers often disagree with the public on the acceptable magnitude of a certain risk. Industry and government standards deem a certain level of risk to be safe, that is, unlikely to cause harm to most people who follow some lifestyle. Unfortunately, the public sometimes sees risk as an all-or-nothing proposition. Any level of risk may seem to be too much. For example, some people do not want to hear that the level of trichloroethylene in their drinking water is below the U.S. Environmental Protection Agency standards; they want the level to be zero. Given this attitude, it can be very difficult to communicate risk.

In addition, scientists and the public often approach risks from two very different viewpoints. Scientists and engineers tend to reject suggestions of a cause with no positive evidence. The public demands strong negative evidence against a cause that looks intuitive. In other words, scientists and engineers come from a "there's no proof it is" standpoint, while the public says, "there's no proof it isn't!" Scientists and engineers also tend to look at population risks when the general public wants to know how the risk affects individuals. Even if the audience agrees with the risk assessors on the magnitude of the risk, they may still oppose risk management efforts or refuse to take action because of personal values (for example, a desire for a pristine environment or the need for personal autonomy; Bennett and Calman 1999).

Providing more technical information will not necessarily eliminate this constraint. However, letting the audience see all the data and helping them understand how trade-offs might be made can help many members of the audience come to terms with the risk. They still may not accept that the risk is necessary and may go on fighting for cleaner water and cleaner air, but they may come to accept the risk communication efforts.

Lack of Faith in Science and Institutions

Researchers have pointed out the decreasing credibility of scientists and government institutions with regard to communicating risk information. Many years ago, Roger Kasperson (1986) warned that public opinion surveys were showing a steady decrease in confidence in industry and government officials, with a decline of up to 50% in some areas from 1966 to 1980. Another study found that confidence in government and industry has been declining for the last 30 years (Harris poll as cited by Peters et al. 1997). Unfortunately, many of these same industries and government agencies are faced with the challenge of communicating risk information today.

> Be aware of your audience's attitudes toward the organization in charge of the risk communication effort and any associated organizations. In some cases, it may be necessary to partner with someone the audience finds credible to convey the risk message.

Those who are communicating risk need to be aware of their audience's attitudes toward the organization in charge of the risk communication effort and any associated organizations. In some cases, it may be necessary to partner with someone the audience finds credible to convey the risk message.

In a survey to measure how audiences determined trust and credibility of organizations, Peters et al. (1997) found that defying a negative stereotype was the most important factor to improving trust and credibility for government and industry. The researchers cited the example of Johnson and Johnson's strong response in the wake of the Tylenol tampering in 1982, exhibiting more openness than is usually attributed to big industry. In any case, those who are communicating risk need to continue to strive for credible and open risk assessment, management, and communication efforts, for only these will fully rebuild the faith that has been lost through past practices.

Learning Difficulties

Another difficulty inherent to the audience is the fact that many people reach adulthood lacking some learning skills. Much has been written about the growing problem of illiteracy. Even when people are highly literate, words and phrases can be misunderstood. Australian researchers Janet Carey and Mark Burgman (University of Melbourne) propose four areas of linguistic uncertainty:

1. **Ambiguity.** A word may have more than one meaning, and synonyms are often used interchangeably.
2. **Vagueness.** The same word may mean different things to different people (for example, the word "significant").
3. **Underspecificity.** Some words are too general and result in differing interpretations.
4. **Context dependence.** The meaning of words can change when they are placed near other words (Tucker et al. 2008).

These kinds of uncertainties challenge the risk communication effort as much as uncertainties in the risk assessment itself.

Additional studies focus on numeracy, the ability of people to understand and use numeric information. People have a limited ability to process large amounts of data, and that ability decreases with age and with stress. Highly numerate people gravitate to numbers, understand them, put them into practice, and use them to make decisions about risks. People who are not very numerate tend to base decisions on emotions and trust (Tucker et al. 2008).

Psychologists also note that people often rely on social media for their information, entertainment, and role models. These factors can conspire to make the job of communicating the scientific concepts of risk extremely difficult.

One way around this is to know your audience. If you are communicating the dangers of reusing unsterile needles to a community whose members never finished high school, are seldom sober, and access social media 9 hours a day, you will need to tailor your message differently than if you are explaining the need to maintain cleanliness to restaurant workers in a Midwestern town where everyone graduated from high school. The information presented in Parts II and III should help you determine which techniques are best suited for your audience's needs.

CONSTRAINTS FOR BOTH COMMUNICATOR AND AUDIENCE

As if these constraints were not enough, other constraints affect both those who are communicating risk and their audiences: stigma and stability of the knowledge base.

Stigma

Both the audience and the risk communicator can be affected by the stigma of being at risk. In many cases, the actual physical risk can be exacerbated by impacts on the economy and society. For example, when a small town in Nevada found itself the focus of a cancer cluster investigation, property values plummeted, people moved to other nearby towns, and tourism took a heavy hit, all because of the perception that something dangerous must be happening there.

Stigma can also affect the psychological well-being of the audience. For example, researchers Robin Gregory and Theresa Satterfield found that dairy farmers in the Tillamook River estuary, long admired for its pristine beauty, felt themselves unwelcome by the growing retirement community because their work had resulted in increased fecal coliform bacteria counts in the local rivers. Because the farmers were associated with this increased health risk, they felt that they were being accused of moral deficiency by simply earning a living (Gregory and Satterfield 2002).

When those at risk are stigmatized, their level of outrage and hostility rises. This increase in emotion can be seen as a destabilizing influence on risk communication efforts. For example, researcher Theresa Satterfield found that some groups were denied access to public meetings because it was assumed they would be disruptive (Satterfield 1996). However, for risk communication efforts to succeed, such exclusionary attitudes must be overcome.

Stigma experts James Flynn et al. (2001) suggest two ways that risk communicators can help to overcome stigma:

1. **Reduce perceived risk.** It is the perception of the danger that drives stigma. This perception can be managed, at least in part, by creating and maintaining trust in those charged with managing the risk, informing and educating the public about the risk, and educating scientific experts on how to more effectively present risk information without increasing stigma.
2. **Reduce the amplification of stigma.** Once begun, stigma has a tendency to grow. Educate the media as well as government regulators on the potential effects of overstating or sensationalizing a risk.

To avoid creating or amplifying stigma, those communicating risk must factor audience concerns into risk communication efforts. As mentioned previously, these include even those concerns that might be seen as tangential to the risk itself. Again, a thorough understanding of your audience may be your best approach. See Chapter 8 for additional information.

Stability of the Knowledge Base

Both science and the information your audience has been exposed to change daily. Today's scientific "facts" may be derided in years to come as tales of superstition and ignorance. Once even learned people thought that the earth was flat and the sun revolved around the earth. Given the knowledge at the time, this was a logical assumption; our knowledge may be similarly outdated in the future. In addition, experts on a particular risk often disagree on the magnitude or effects of the risk. The study that you quote extensively can come under fire as being too general or too specific. The experts you bring forth to discuss the risk may be confronted with results of a study by colleagues who directly contradict their findings. These kinds of problems can make the public dubious about any scientific procedure.

Both science and the information your audience has been exposed to change daily. Today's scientific "facts" may be derided in years to come as tales of superstition and ignorance.

Your audience's knowledge base also changes. For example, 2 weeks ago when you finished your audience survey, the local news station had not aired complete coverage of the risk you were trying to communicate, and perceptions changed after that. We once watched in dismay while a news broadcast explained why the waste tanks at a nuclear facility (our customer) were "burping" dangerous gases, all the while showing a picture of radiation-suited individuals loading plutonium pellets into a nuclear reactor. The spoken story was about the risks associated with storing hazardous and radioactive waste; the visual story was about what a reactor looks like. At no time were the tanks or procedures there shown. Those of us who were communicating the risks now had to contend with a number of audience misperceptions.

This constraint can be difficult to overcome because it is often the least within the control of the communicator. Planning ahead and keeping abreast of what is happening in science and the community can help. Planning is discussed further in Part II. Keeping abreast can be enhanced by subscribing to those information sources most respected by your audience and by whatever branch of science you are communicating about. Read the local newspaper, watch local newscasts, consult community groups on social media, and develop relationships with local print and television news media representatives (see Chapter 8 for more details).

SUMMARY

Many constraints can hinder the effective communication of risk, including organizational and emotional constraints affecting those who are communicating the risk, cultural alignment, hostility and outrage, panic and denial, apathy, mistrust of the risk assessment process, disagreement on the acceptable magnitude of risk, lack of faith in science and institutions, and learning difficulties for the audience, and stigma and the changing knowledge base for both communicators and audience. Those who are communicating risk need to recognize potential constraints and act to overcome them for risk communication efforts to succeed.

REFERENCES

Arvai, J. L. 2003. "Using Risk Communication to Disclose the Outcome of a Participatory Decision- Making Process: Effects on the Perceived Acceptability of Risk-Policy Decisions." *Risk Analysis*, 23 (2): 281–290.

Balch, G. I. and S. M. Sutton. 1995. "Putting the First Audience First: Conducting Useful Evaluation for a Risk-Related Government Agency." *Risk Analysis*, 15 (2): 163–168.

Barill, T. 1991. "Communicating Risk to Communities." In *Superfund '90, Proceedings of the 11th National Conference*, Hazardous Materials Control Research Institute, Washington, DC, pp. 98–100.

Beierle, T. C. 2002. "The Quality of Stakeholder-Based Decisions." *Risk Analysis*, 22 (4): 739–750.

Bennett, P. and K. Calman. 1999. *Risk Communication and Public Health*. Oxford University Press, New York.

Boiarsky, C. 1991. "Writing for Multiple Readers with Conflicting Needs: An Opportunity for Improving Communication with Regulatory Agencies." In *The Engineered Communication: Designs for Continued Improvement, Proceedings of the 1991 International Professional Communication Conference*, Vol. 2, 91CH3067-4. Institute of Electronics and Electrical Engineers, Washington, DC, pp. 313–317.

Covello, V. T., P. M. Sandman, and P. Slovic. 1988. *Risk Communication, Risk Statistics, and Risk Comparisons: A Manual for Plant Managers*. Chemical Manufacturers Association, Washington, DC.

Davenport, C. 2003. "Utilities Discover Message Matters." Washington Post, October 6, p. B01.

Dozier, D. M., L. A. Grunig, and J. E. Grunig. 1995. *Manager's Guide to Excellence in Public Relations and Communication Management*. Lawrence Erlbaum Associates, Mahwah, New Jersey.

FDA (U.S. Food and Drug Administration). 2009. Minutes of the Risk Communication Advisory Committee, FDA. http://www.fda.gov/downloads/AdvisoryCommittees/CommitteesMeetingMaterials/RiskCommunicationAdvisoryCommittee/UCM190625.pdf (accessed October 15, 2017).

Flynn, J., P. Slovic, and H. Kunreuther, eds. 2001. *Risk, Media, and Stigma: Understanding Challenges to Modern Science and Technology*. Earthscan, London.

Green, M., J. Zenilman, D. Cohen, I. Wiser, and R. Balicer. 2007. *Risk Assessment and Risk Communication Strategies in Bioterrorism Preparedness*. NATO Security Through Science Series-A: Chemistry and Biology, Springer, Dordrecht, The Netherlands.

Gregory, R. S. and T. A. Satterfield. 2002. "Beyond Perception: The Experience of Risk and Stigma in Community Contexts." *Risk Analysis*, 22 (2): 347–358.

Giahyue, J. H., and E. Farge. 2015. "Watch Closely and Explain Frequently: Liberia's Ebola Lessons." Reuters, www.reuters.com/article/health-ebola-liberia-idUSL5N0WF2GR20150313 (accessed August 1, 2017).

Hance, B. J., C. Chess, and P. M. Sandman. 1988. *Improving Dialogue with Communities: A Risk Communication Manual for Government*. New Jersey Department of Environmental Protection, Division of Science and Research, Trenton, New Jersey.

Henry, R. 2000. *You'd Better Have a Hose if You Want to Put Out the Fire: The Complete Guide to Crisis and Risk Communications*. Gollywobbler Productions, Windsor, California.

Hillier, D. 2006. *Communicating Health Risks to the Public: A Global Perspective*. Gower Publishing, Farnham, UK.

Hunt, B. and J. Monaghan. 1992. "How Public Issues Shape Environmental Restoration Plans Experiences with Colorado UMTRA Projects." In ER'91: Proceedings of the Environmental Restoration Conference for the U.S. Department of Energy. U.S. Department of Energy, Washington, DC.

Kaplan, D. M. 2013. "A Risky Science Communication Environment for Vaccines." *Science* 342: 53–54.

Kasperson, R. E. 1986. "Six Propositions on Public Participation and Their Relevance for Risk Communication." *Risk Analysis*, 6 (3): 275–281.

Leiss, W. and D. Powell. 2005. *Mad Cows and Mother's Milk: The Perils of Poor Risk Communication*, 2nd ed. McGill-Queen's University Press, Montreal, Quebec, Canada.

Morgan, G., B. Fischhoff, A. Bostrom, L. Lave, and C. J. Atman. 1992. "Communicating Risk to the Public." *Environmental Science and Technology*, 26 (11): 2048–2056.

Morgan, G., B. Fischhoff, A. Bostrom, and C. J. Atman. 2002. *Risk Communication: A Mental Models Approach*. Cambridge University Press, Cambridge, UK.

Occupational Safety and Health Administration (OSHA). 2007. Pandemic Influenza Preparedness and Response Guidance for Healthcare Workers and Healthcare Employers. OSHA 3328-05, OSHA, Washington, DC.

Peters, R. G., V. T. Covello, and D. B. McCallum. 1997. "The Determinants of Trust and Credibility in Environmental Risk Communication: An Empirical Study." *Risk Analysis*, 17 (1): 43–54.

Sanderson, W. and K. Niles. 1992. "Effective Outreach Is Good Public Policy." In ER '91: Proceedings of the Environmental Restoration Conference for the U.S. Department of Energy. U.S. Department of Energy, Washington, DC.

Satterfield, T. A. 1996. "Pawns, Victims, or Heroes: The Negotiation of Stigma and the Plight of Oregon's Loggers." *Journal of Social Issues*, 52 (1): 71–83.

Tal, A. 1997. "Assessing the Environmental Movement's Attitudes Toward Risk Assessment." *Environmental Science and Technology*, 31 (10): 470A–476A.

Tucker, W. T. and S. Ferson. 2008. "Strategies for Risk Communication: Evolution, Evidence, Experience." *Annals of the New York Academy of Sciences*, 1128. DOI: 10.1196/annals.1399.000.

UK EA (Environmental Agency of the UK). n.d. "Improving Institutional and Social Responses to Flooding." Science Summary SCHO0509BQBM-E-P, Environmental Agency of the UK, London.

ADDITIONAL RESOURCES

Chess, C., P. M. Sandman, and M. R. Greenberg. 1990. *Empowering Agencies to Communicate about Environmental Risk: Suggestions for Overcoming Organizational Barriers*. Rutgers University, Cook College, Environmental Communication Research Program, New Brunswick, New Jersey.

Hadden, S. G. 1990. "Institutional Barriers to Risk Communication." *Risk Analysis*, 9: 301–308.

Hance, B. J., C. Chess, and P. M. Sandman. 1988. *Improving Dialogue with Communities: A Risk Communication Manual for Government*. New Jersey Department of Environmental Protection, Division of Science and Research, Trenton, New Jersey.

Sandman, P. M. 1989. "Hazard versus Outrage in the Public Perception of Risk." In V. T. Covello, D. B. McCallum, and M. T. Pavlova, eds., *Effective Risk Communication: The Role and Responsibility of Government and Nongovernment Organizations*. Plenum Press, New York, pp. 45–49.

5

ETHICAL ISSUES

Ethics can be a difficult subject. One reason for this is that each of us has our own ethical code, our own morality, that has been shaped by our experiences and beliefs. This personal code makes ethical issues subjective; what is an issue for me may not be one for you. Another reason is that ethics is a philosophical study with its own language and concepts. Although we are not ethicists, we wanted to provide a general overview of some of the ethical issues often faced, either directly or indirectly, by those who are communicating risk. Therefore, this chapter discusses potential ethical issues and associated decisions. It does not tell you what decision to make but rather helps you weigh the potential outcomes of the possible choices.

Producing any form of technical communication can result in ethical difficulties. Questions such as how much information to release, to whom should it be released, and who makes those decisions are connected with the dissemination of any type of information. The Society for Technical Communication, the largest professional society for those who communicate scientific or technical information, publishes "Ethical Principles for Technical Communicators" (STC 1998)

Risk Communication: A Handbook for Communicating Environmental, Safety, and Health Risks,
Sixth Edition. Regina E. Lundgren and Andrea H. McMakin.
© 2018 The Institute of Electrical and Electronics Engineers, Inc., and Regina E. Lundgren
and Andrea H. McMakin. Published 2018 by John Wiley & Sons, Inc.

that recognize such ethical issues as complying with regulations, honesty, confidentiality, and fairness.

The communication of risk carries additional potential ethical issues, such as when and how much information should be released, whether the use of persuasion is appropriate, and the relationship between public danger versus private interests. Such ethical issues can arise in care, consensus, and crisis communication. Ethical issues in risk communication can be divided into three areas: social ethics, organizational ethics, and personal ethics.

The Society for Technical Communication and the International Association of Business Communicators are among the professional organizations that publish codes of conduct such as complying with regulations, honesty, confidentiality, fairness, and objectivity.

SOCIAL ETHICS

Social ethics comprise the code of conduct by which society judges our behavior. As a society evolves and changes, so will its ethics and the resultant behavior. Not surprisingly, social ethics can differ between countries and between cultures within that country (see Chapter 23 for more information). Risk communication has also evolved to meet changing societal demands. However, the influence of society on the communication of risk can itself be an ethical issue. Other social ethical issues related to risk communication are how the risk idiom is used, by whom, and when; whether the risk is being applied equally to all ethnic and social groups; who should bear the consequences if messages are misunderstood; and the stigma.

The Sociopolitical Environment's Influence

Society has changed over the years, especially in the way in which it views risks and how risk decisions are made. Joseph Beck, social scientist and former congressional and presidential advisor, attributes these changes in public involvement to changes in governance ideologies. Until the 1950s, he says, the United States insisted on strong national governance, or federalism. The threat of Communism and the Cold War in the 1950s led to a change in the education system, in which the "virtues of the national government being controlled by its peoples was (sic) firmly entrenched in the minds of the largest mass of school children ever taught in any school system in the world" (Beck 1991, p. 1). As this group moved through the educational system and into the larger society, they made sure that this view of government by the people was upheld. A good example, according to Beck, is the way this group mounted an effort that resulted in the American abandonment of the Vietnam War.

James Creighton of Creighton and Creighton, the consulting firm responsible for many of the Bonneville Power Administration's successes in the area of risk communication and public involvement, has also observed changes in society in the areas of public involvement and risk communication. His focus was on how the public decided to accept any particular decision, such as how a risk would be managed. According to Creighton, in the 1950s, the public felt that a decision was acceptable if they had been informed about it. All an organization had to do was to produce the proper information and disseminate it widely. In the 1960s and 1970s, society's views changed: Now, the public felt that it must be heard first before a decision could be made. Agencies moved into the age of public involvement, but mostly in the form of written testimony and formal hearings. Beginning in the 1980s and continuing today, Creighton says, society feels that it must actually influence the decision. This has led to a form of public involvement that is referred to as consensus building, trying to get all parties to agree on a decision before it is implemented and involving the public in all aspects of risk assessment, management, and communication (Creighton 1992).

More recently, Granger Morgan and his associates from Carnegie-Mellon University laid out historical stages through which organizations have viewed their charter to assess, communicate, and manage risks:

- All we have to do is get the numbers right.
- All we have to do is tell our audience the numbers.
- All we have to do is explain what we mean by the numbers.
- All we have to do is show our audience that they have accepted similar risks in the past.
- All we have to do is show our audience that it is a good deal for them.
- All we have to do is treat our audience nicely.
- All we have to do is make our audience our partners (Morgan et al. 2002).

If these researchers are correct, and we believe they are, these changes in society can pose a number of ethical issues. If the public demands the right to be involved in risk decisions throughout the cycle of assessment, management, and communication, then is it appropriate for organizations to stick to the old ways of making decisions and informing the public afterward? Is it right to take public testimony but simply go on with whatever decision the organization hoped for to begin with? Is it prudent to exclude public participation in a crisis? Should the mandates of such agencies as the U.S. Environmental Protection Agency and local health departments be changed to allow and encourage them to bring the public more fully into the decision-making process?

The choice for those who are communicating risk is whether or not to involve interested participants in the full cycle of assessment, management, and communication of risk and to what extent. Admittedly, this involvement will be different in care, consensus, and crisis communication; however, each type can carry some kind of involvement. Table 5.1 shows the advantages and disadvantages of each choice. For a more in-depth discussion of public involvement, see Chapter 17.

Table 5.1. Advantages and Disadvantages of Involving the Public in Risk Assessment, Management, and Communication

	Involve the Public	Do Not Involve the Public
Advantages	Because public participates in risk decision, decision is likely to last Project schedules and budgets less likely to be affected later by lawsuits Can increase organization's credibility. Provides organization with broader information net	Organization will not have to change the way it does business No chance of loss of control
Disadvantages	Risk managers may resist because of fear of loss of control Lack of organizational commitment can result in loss of credibility Requires more time at the beginning of the process	Risk analysis, decision, and communication can be held up in court indefinitely, delaying project schedules and increasing budgets Organization's credibility decreases. Loss of potential information critical to understanding risk

The Use of the Risk Idiom

On a slightly smaller scale is the ethical issue of who determines what is a risk and to whom the risk will be communicated. Audiences often take umbrage at the terms "insignificant" or "negligible" when applied to the magnitude of risk, yet these are terms experts often use to generalize complicated risk assessment calculations. Who decided that the risk was insignificant? Was the judgment based on scientific principles alone or were the audience's values considered? Who decided what part of the information was to be disseminated if not the entire set of assessment calculations? Who decided who would receive the information? These issues derive from the ethical questions of power and fairness.

Who decided what part of the information was to be disseminated if not the entire set of assessment calculations? Who decided who would receive the information? These issues derive from the ethical questions of power and fairness.

The choice for those who are communicating risk is to determine how soon to become involved in the risk assessment process as the audience's representative.

Although the expert who is assessing the risk (and who may be communicating it) is involved from the beginning, the technical communicator, risk manager, or public affairs person is sometimes not involved until the risk assessment has been completed. In either case, those who are communicating risk must determine audience concerns and perceptions of the risk and help decide how to factor these concerns and perceptions into the risk assessment process. Concerns and perceptions can be factored in at several stages in the process (Table 5.2), or not at all, leaving the risk communication efforts to compensate. In many situations, the best stage to factor in audience concerns and perceptions is during the planning of the risk assessment because concerns and perceptions can be more easily integrated without a delay in schedule or an increase in budget. Another stage is when the scenarios (that is, the lifestyle characteristics and other factors to be considered in the calculation of risk) are being developed (for example, the risk to children from ingesting apple products coated with a pesticide). At this stage, the audience concerns and perceptions may point to different scenarios than those being considered by the experts, and revision may give the risk assessment more credibility for the audience.

Another stage at which audience concerns and perceptions can be factored into the risk assessment is in the choice of data to be collected. Using the example of the children ingesting apple products, perhaps the expert had decided not to collect data on preschool children because of the potential dangers associated with testing chemicals on humans and the greater expense of other data collection methods. If an analysis of audience concerns and

Table 5.2. Stages When Audience Concerns and Perceptions Can Be Factored into the Risk Assessment or Risk Communication Efforts[a]

Stage	Advantages of Consideration	Disadvantages of Consideration
Risk assessment	Less likely to delay schedule or increase budget Concerns integrated throughout process	Because risk is not fully understood, integration in planning may be difficult and require changes later
Scenario development	Suggest additional or different scenarios	Potentially increases time and cost to explore more options
Data collection	Can suggest additional data sources	Potentially increases time and cost to explore more options
Analysis	Provide audience-specific review of data and results	Potentially increases time and cost to explore more options
Risk communication	Communication more likely to be understood	Assessment is less likely to be accepted if this is the only place of involvement May require more resources to communicate effectively

[a] Note that some agencies advise that risk assessment, risk management, and risk communication will be most successful if the audience is involved in all stages of the process (NRC 1996).

perceptions shows that the danger to preschool children is the main concern, innovative methods may have to be developed so that these data can be collected and this concern can be addressed.

Another stage in which concerns and perceptions can be factored into the risk assessment and management process is how the scenarios and data are analyzed. Is there a particular method that will be more credible with the audience? The latest generation of environmental and health risk software include graphical interfaces that allow stakeholders to manipulate data and set up analyses. Also, many audiences find the assessment more believable if more than one group of experts analyzed the information and reached similar conclusions. On the other hand, some members of the audience will be satisfied only if their chosen expert has conducted the analysis.

Audience concerns and perceptions must be factored into the risk communication effort, if nowhere else. Note, however, that extensive experience taught U.K. public health experts Peter Bennett, David Coles, and Ann McDonald that "risk management that overlooks stakeholders' basic concerns cannot usually be saved by good communication techniques late in the day" (Bennett and Calman 1999, p. 207).

Those who are communicating risk must know to whom they are communicating and what information that audience requires or risk communication efforts will likely fail. However, if audience concerns and perceptions have not been considered earlier in the process, those who are communicating the risk will likely have a much more difficult job of explaining (and justifying) the risk information.

Fairness of the Risk

One social ethical issue of concern is whether the risk is spread equitably over all ethnic and social groups. According to Dr. Robert Bullard, Director of the Environmental Justice Resource Center, Clark Atlanta University, and author of *Dumping in Dixie: Race, Class, and Environmental Quality* (Bullard 1990), "People of color (African Americans, Latinos, Asians, and Native Americans) have borne a disproportionate burden in the siting of municipal landfills, incinerators, and hazardous waste treatment, storage, and disposal facilities" (Bullard 1992, p. 11). In the early 1990s, Congress passed legislation to ensure that future efforts to site potential environmental risks such as factories and landfills considered the equity of the risk. The term coined was "environmental equity" or "environmental justice" (see Chapter 3 for more information on the executive order that mandates environmental justice).

> People of color (African Americans, Latinos, Asians, and Native Americans) have borne a disproportionate burden in the siting of municipal landfills, incinerators, and hazardous waste treatment, storage, and disposal facilities.
>
> —Robert Bullard (1992, p. 11)

Because of recent laws, environmental equity is often considered long before any risk communication effort begins. On the other hand, poor risk communication, accompanied by unresponsive risk management, may cause those at risk to perceive a lack of equity. In either case, those who are communicating risk need to be aware of the potential issue because of its possible effect on risk communication efforts. If the audience's perception is that the risk is being shared inequitably, the level of anger and hostility will rise, making any risk communication effort (care, consensus, or crisis) extremely difficult. (Angry people do not listen.) One way to lessen the anger and hostility is to give the audience a role in how the risk is being assessed and/or managed. For example, if the concern is that the fumes from the siting of a sewage plant will pass over a particular neighborhood, possibly endangering the inhabitants, those inhabitants could be involved in assessing the risk of breathing the fumes (perhaps by determining scenarios or data to be collected) or in operating community air monitoring stations to ensure that the releases do not go over an agreed-upon level.

Consequences of Multiple Meanings

Another ethical issue within society is what happens when messages are misunderstood. Who is to blame when a worker misunderstands a safety procedure and is injured? Is it the fault of the worker for not reading properly, the organization for failing to properly train the worker, the manufacturer of the equipment involved, or the communicator who wrote a message that could be misunderstood?

In any given situation, any message can be misunderstood. No matter how much we analyze our audience, there will always be someone within it who misinterprets the risk message. For example, at a public meeting on the proposed siting of a wind energy project (windmills to generate electricity), the representative of the company making the proposal spoke at length about how the windmills were constructed and how they would be arranged on the site. At one point he made the statement, "We have to site the windmills so far apart because when the wind hits them, they take 25% out of the wind and the wind needs time to recover before it hits the next windmill for maximum efficiency." A member of the audience later expressed a concern: "But if you take away some of the wind, won't there be less air for the rest of us?" The spokesperson was talking about velocity, but the member of the audience was thinking in terms of volume.

> In any given situation, any message can be misunderstood. No matter how much we analyze our audience, there will always be someone within it who misinterprets the risk message.

The choice for those who are communicating risk is how much information about the audience to collect. What information is necessary to understand how the audience thinks? A principle of technical communication related to gathering information about the audience is “audience, purpose, and use.” For risk communication, this equates to know your audience, know why you are communicating with them (purpose), and know how they plan to use the information. In Chapter 8, we rank gathering information on the audience into three tiers: baseline, midline, and comprehensive. In choosing the appropriate tier, consider your resources (time, money, and staff), the purpose of your risk communication effort (care, consensus, or crisis), and your specific objectives. Also consider pretesting your messages to identify and correct as many potential misunderstandings as possible before wide dissemination.

The Issue of Stigma

As mentioned in Chapter 4, communities or individuals facing certain risks can also face societal disapproval or stigmatizing behavior. A child born to a mother with AIDS may be avoided by neighbors uneducated in the transmission mechanisms. A scenic coastal area may lose tourist trade after an oil spill blackens beaches farther north.

Those at risk and organizations charged with managing the risks are often quick to blame the news media for such stigma. While sensationalized stories in the public view can increase stigma, so can other factors. For example, researchers Theresa Satterfield and Robin Gregory found that risk mitigation measures, such as protective barriers around a hazardous waste site, actually increased perceptions of risk and thus stigma (Gregory and Satterfield 2002).

More pointedly, a major contributor to stigma can be the careless use of risk information by otherwise conscientious scientists. Even civic-minded organizations have been known to manipulate risk information to make their point about the perceived dangers of a particular substance. For example, when the National Resources Defense Fund protested the use of the chemical Alar on apples and their story was prominently featured on national television, prices for the fruit plummeted.

The question for those communicating risk is how to present information appropriately for various segments of the audience without raising undue concern. Those at risk must understand their situation if they are to take appropriate action to eliminate or minimize the potential impacts. Those charged with managing the risk must understand the magnitude of the risk and potential management mechanisms. James Flynn, expert on the topic of stigma, advises educating risk assessment scientists and the news media on how stigma can impact communities (Flynn et al. 2001). Even if this education is impossible given the particular circumstances, risk communicators must understand their audiences. See Chapter 8 for additional information.

> Manipulation of framing [in public health information] is arguably unethical and probably impractical.
> —Peter Bennett and Sir Kenneth Calman (1999, p. 216)

ORGANIZATIONAL ETHICS

Besides the societal scheme of ethics, agencies and corporations have their own organizational ethics. In many organizations, it is now standard practice for a newly hired employee to be required to read the organization's code of ethics and to sign a formal statement promising to abide by it. In others, the code is less formal and may even take some deciphering by the new employee. Nevertheless, some such code exists, formal or informal, within every organization. Organizational ethical issues relate to how that code handles such things as the legitimacy of representation, designation of primary audience, release of information, and attitude toward compliance with regulations.

Legitimacy of Representation

Legitimacy of representation refers to who is trusted to speak for whom—for the organization or for the audience—and whether the information being presented on the risk actually represents the risk. An organization usually has rules as to who is allowed to represent it before external audiences, how that person is prepared, and how the information to be presented is tailored for release. In some organizations, only staff in the public affairs department are allowed to speak for the organization. In others, managers or staff knowledgeable in a particular area are allowed to present information, as long as they have received training in such areas as public speaking and media relations. In rare cases, anyone who happens to be in the right (or wrong?) place at the right time will end up as the organization's spokesperson.

Usually, the information presented is passed through some sort of organizational screening review first. This review can range from a grammar check or presentation dry run to ensure that the information is in standard language, to a complex system in which a written version of the planned speech or a draft of an article is reviewed by the legal office, line or project managers, peer reviewers, and communications specialists.

The choices for those who are communicating risk are who to send to a particular audience, how to train that person, and how to ensure that the information presented meets the audience's needs. The choice of spokesperson is among an expert on the risk, a person who has a high level of accountability in managing the risk (risk manager), a communications specialist (technical communicator, public relations specialist, or public information officer), or a celebrity (someone the audience knows and trusts). Table 5.3 shows which audiences are likely to accept each spokesperson and areas in which each spokesperson may need training. For more information on choosing a spokesperson, see Chapter 15. For more information on determining audience needs, see Chapter 8.

A related ethical issue is who the organization accepts as having the right to speak for the audience. For example, a group or individual may step

Table 5.3. Matching Spokespersons to Audience Characteristics

Audience Characteristics	Spokesperson	Potential Training Needed
Are interested in technical details Are not particularly hostile Have at least a basic understanding of the risk	Expert	Public speaking Media relations
Are interested in who is accountable Are hostile Have a basic understanding of the risk	Risk manager	Public speaking Media relations Risk assessment
Are interested in passing information on to others (for example, news media) Are not particularly hostile Have little understanding of the risk	Communications specialist	Risk assessment[a]
Have some general knowledge of risk area	Celebrity	Risk assessment are apathetic to or unaware of specific risk

[a] Assumes that communications specialists have backgrounds in public speaking and media relations.

forward and claim to be representatives of "the public." They may act as if they are the *only* representatives and their views are the only legitimate ones. However, seldom does any one group or individual encompass all aspects of an audience.

The choice for those who are communicating risk is how to determine who represents the audience. The way to make this choice is to know all the components of your audience. For example, in assessing the risk of developing carpal tunnel syndrome among those who use computers, components of the audience could be divided into job categories related to computer use: computer programmers and database managers, secretaries and clerks, other nonclerical professionals, and managers. The members of each of these components view computer use differently (and may stand at greater or lesser risk). In choosing who represents the audience, those who are communicating risk may want to choose at least one representative from each of these components. More information on audience analysis can be found in Chapter 8.

A group or individual may step forward and claim to be representatives of "the public." They may act as if they are the *only* representatives, and their views are the only legitimate ones. However, seldom does any one group or individual encompass all aspects of an audience.

Designation of Primary Audience

Another potential ethical issue within the organization is the designation, either formally or informally, of the "primary audience." The primary audience is the segment of the audience with the highest priority in the risk communication effort. In many cases, the needs of this segment of the audience are considered above the needs of other audience segments. When resources are scarce, the needs of the primary audience are often the only needs considered.

The choice of primary audience should be based on several considerations, such as the following:

- Which segment of the audience is most at risk
- Which segment of the audience has the least information with which to make choices on how to manage the risk
- Which segment of the audience will be most involved in making choices on how to manage the risk (including those that must be involved for legal reasons)

In many situations, the first aspect, which segment of the audience is most at risk, would be the primary consideration. However, in some organizations, the third aspect becomes the most, and sometimes the only, aspect of importance. In other words, those who are communicating risk are forced to communicate in such a way as to meet only the needs of internal senior management who will make a final decision concerning the risk, an audience that is likely not part of the audience at risk. When only this segment of the audience has its needs met, the risk communication effort will fail. However, if this audience is ignored, risk communication efforts will lack the needed support to succeed (see Chapter 4 for more information). For example, in an organization responding to an external audit of a safety program, appeasing internal management can come before fixing some of the problems identified.

The dilemma for those who are communicating risk is how to meet the needs of all audiences. Carolyn Boiarsky, a communication consultant for industry and government, suggests holding a meeting of those who are communicating risk, subject matter experts, and senior management to understand the context of the risk communication effort and to align internal approaches. She also suggests designing an appropriate format for documentation of risk in which information for particular audiences is separated into sections or placed in an appendix that can be skimmed or ignored by less interested readers (Boiarsky 1991).

Releasing Information

Another ethical issue within organizations is the release of information. This issue has two aspects. First, audiences generally want as much information as they can get as early in the process as possible. However, organizations often release as

Audiences generally want as much information as they can get as early in the process as possible. However, organizations often release as little as possible as late as possible, for several good reasons.

little as possible as late as possible, for several good reasons. One is that early risk information—information gathered shortly after the risk has been identified—has not been subjected to the kind of peer review necessary to ensure the validity of the scientific results. Another reason is that much risk information is either classified in some way (so that releasing it before a certain time would be detrimental to national security) or proprietary (early release would damage the organization's financial or competitive standing). However, the question arises of whether it is right to put scientific, national, or organizational interests before those of the people at risk. For example, when the government of Japan chose to wait to issue updated information on the risks associated with the Fukushima incident in 2011, the citizens of one city evacuated north, thinking that the winds would be blowing to the south. Instead, they walked directly into the plume of radioactive contamination (Center for Biosecurity 2012).

The choice for those who are communicating risk is to determine when and how much information to release. The choice should be based on organizational, legal, and audience requirements. The risk communication literature advocates releasing as much information as possible as soon as possible. However, if this is your choice, remember to release that information with sufficient caveats as to its stage of scientific uncertainty. One caveat of our own, however, is that if you are releasing information associated with some legal proceedings (a lawsuit, compliance with the National Environmental Policy Act, or meeting some other legal commitment), be mindful of your legal responsibilities. One federal agency released an environmental impact statement for a nuclear plant that would use an innovative method of producing isotopes. To protect themselves (and because this was the standard procedure for the organization preparing the statement), they put a lengthy disclaimer on the inside cover of the document. The disclaimer basically said that the information in the statement was so preliminary that no one in the organization or the agency was willing to be accountable for anything in the environmental impact statement! Based largely on that disclaimer, an environmental activist group promptly sued the agency for failing to live up to the due process of law. Because of this lawsuit, the project was scrapped entirely.

The second aspect of releasing information that can be an ethical issue is the archiving and possible release of draft information. This is the information that led up to the preliminary results: draft input on scenarios to be considered, hand calculations of various types, and even the first drafts of the risk communication messages. Those who are communicating risk (as well as others in the risk assessment process) often file a number of early "drafts," most of which are never intended to be read by anyone outside the group assessing and communicating the risk and which may contain proprietary or even embarrassing information (some reviewers can be quite scathing in their comments on drafts). However, when a lawsuit has been filed against an organization, these drafts may be some of the first information to be requested for use in court. In addition, the Privacy Rule for individual health information (see Chapter 3) describes ways to manage some risk information. So, the question is, should an organization limit the amount of this type of information that can be kept on file, or would this limitation be a form of censorship?

The choice for those who are communicating risk is how many drafts should be archived, based on the needs of the audience and the needs of others within the organization who are using the information. If the organization has a policy that is too limited for audience and risk assessment purposes (for example, a policy that only final versions of documents are kept), those who are communicating risk may need to work to advocate a change in policy. For example, an external panel of experts overseeing an effort to determine radiation doses received by a population near a government nuclear facility had trouble finding unclassified information. When it became apparent that it was inappropriate to declassify all the necessary information, they requested the government to grant certain members high-level security clearances so they could review the information and assure the public that no pertinent data were being left out of the assessment. See Chapter 4 for more information on dealing with restrictive review procedures or lack of management support.

Attitude toward Compliance with Regulations

Another ethical issue that may arise in organizations is the attitude toward compliance with regulations. Most organizations have wisely chosen to follow regulations, and those that have decided otherwise face legal as well as ethical difficulties that are beyond the scope of this book. Almost as important as following a regulation, however, is the way in which the regulation is followed. When compliance is viewed as an onerous duty at best or a way to subvert democracy at the very worst, risk communication, and all other efforts, can only suffer. For example, the staff for one government contractor refers to their response to Freedom of Information Act requests as "malicious compliance." That is, when a public group has to resort to threatening to sue to get necessary risk information, the organization dumps every piece of unanalyzed, unfiltered raw data onto the group in hopes that this truckload of information will take the group so long to decipher that they will no longer have the resources to "bother" the organization. This approach further frustrates and alienates the audience.

> Communicator's Serenity Prayer: "Grant us the serenity to compromise with the publics we cannot change, the courage to persuade the publics we can change (when it is socially responsible to do so), and the wisdom to know the difference."
> —David Dozier et al. (1995, p. 14)

The choice for those who are communicating risk is how to comply with regulations in such a way as to assist the risk communication effort. As with many of the ethical questions faced by communicators, the issue is to balance the needs of the organization with those of the audience. One key to this is understanding and respecting the audience. The information in Chapter 8 should provide some useful guidelines.

PERSONAL ETHICS

Another area that must be considered is your own personal ethics. What do you believe is the right way to present risk information? What do you believe your role as the communicator of risk should be? What is your personal code of honor, and what would you do if following it conflicted with following your organization's code of ethics?

Using Persuasion

One of the ways to present risk information is by using persuasion, which purposefully presents risk information with the intent of forcing an opinion on the audience. Persuasive arguments may be used to alarm the audience and motivate them to action for fear of loss of life or livelihood. Those who communicate risk in this way often justify it by saying that in some situations, such as a crisis, time is limited and risks are high; therefore, the risk communicator should use every communication tool to get people to do what is best for them. But even in a crisis, does any organization have the right to tell others what is best?

> . . . [T]he power to change behavior carries the immense ethical responsibility to use this power wisely.
> —David B. McCallum (1995, p. 65)

The choice for those who are communicating risk is whether persuasion is justified in their situations. Situations in which persuasion has been justified by risk communicators are those that have one or more of the following characteristics:

- At least some component of the audience is in immediate danger of injury or death (as in crisis situations).
- Those at risk are not the same as those engaged in the behavior and have little control over those engaged in the behavior (for example, unborn babies of alcoholic mothers).
- The audience consists of fewer than 10 people who all feel that they are social equals of the risk communicator (in a small group of equal standing, there is more likelihood that the audience will consider the arguments and not feel as if they are being coerced).

- The audience has specifically asked to be persuaded (for example, by inviting a speaker in for a lively debate).

The Role of the Communicator

Another personal ethical question is, "What should my role be in the communication of risk information?" Should we be disseminators of information, the conduit through which technical information flows and the audience's needs are communicated back to the decision maker? Should we "sell" the risk decision? Or should our knowledge of the audience and communication methods help the decision maker determine what the ultimate decision should be?

> Those charged with making and implementing policies governing our affairs must understand the limits of science as well as its promise, and scientists must learn the limits of policy, the processes by which policies are established in a democratic society, and how to communicate scientific information to the policy process.
> —American Institute of Biological Sciences

Your choice of role will depend on organizational and personal factors. If the organization recognizes that those who are communicating risk are a vital part of the risk assessment team, the range of roles available will be wider than in an organization that views risk communication as a necessary evil. Some audiences will want to interact only with decision makers and, hence, limit interactions with others who might communicate risk. In addition, some risk communicators may not have the skills necessary to fill a larger role or have not realized that a larger role can exist.

Liability and Professional Responsibility

Can communicating risks get you in trouble? When is it your professional responsibility to communicate risk even when you are dismissed or attacked by others?

In 2012, seven scientists were convicted of manslaughter and given 6-year jail sentences for advice they gave ahead of an earthquake that killed 309 people in an Italian town in 2009. The judge said that they had carried out a "superficial, approximate, and generic" risk analysis, and that they gave false reassurance to citizens (Cartlidge 2014).

The verdict sparked protests from scientists around the world, concerned that it would have a chilling effect on communicating risk. In fact, in 2014, appeals court judges reversed the verdict for all but one of the scientists, who was the deputy head of Italy's Civil Protection Department when the earthquake hit. Though the judges said that the scientists could not be blamed for the risk analysis they conducted, some people, including other scientists, still felt that they should have been held accountable.

Scientists and other risk communicators sometimes face denial, outrage, ridicule, and even threats when they've communicated about controversial issues such as vaccinations, climate change, food risks, and HIV prevention. This sentiment reached a boiling point in 2017, when thousands of scientists and supporters around the world, feeling increasingly under siege, took a public stand by participating in the March for Science.

These situations raise the question of when scientists need to worry about backlash and when they have a professional and ethical responsibility to communicate to the public about a potential threat to their health, security, or environment. Some considerations and guidelines follow:

- Follow the regulations and guidelines of your institution when speaking about risks. Or, if you don't agree, make an effort to get them changed.
- Realize that nonscientists may perceive and rank the risks differently than you do, such as deciding when a risk is significant or urgent enough to speak up. If in doubt, audience research can help you understand when and how much to say.
- When considering speaking out on a particular risk, think about seeking advice first with science peer networks like ResearchGate.
- Make it clear whether you are representing an organization or yourself as an individual.
- Depending on the situation and your role, and especially in consensus communication, focus on helping people make decisions rather than telling them what to do.
- Find partners. Your risk information will have more credibility if you're teaming with others who are known and trusted by those you're trying to reach.
- When asked to address someone else's risk interpretation with which you don't agree, don't make it a personal attack. Stick to the facts and evidence.
- Don't get into arguments on social media—they are usually fruitless and can damage your credibility.
- If faced with harassing correspondence, hostile bloggers, demands for private information, or attacks from mainstream media, you may find sound advice in a guide published by the Union of Concerned Scientists (2012).

Organizational Ethics or Personal Ethics?

Perhaps the most difficult ethical dilemma comes when personal ethics conflict with organizational ethics. The organization has asked you to downplay, ignore, or, worse, cover up some risk information that, if released, could prevent the injury or death of a number of people. Yet you have a certain loyalty to the organization that issues your paycheck. Which do you listen to, your organization's need to protect itself (and perhaps your job) or your conscience's need to ensure that no one is hurt? Examples of this can be seen in some classic disasters: the engineering staff who warned about the integrity of the O-rings before the explosion on the space shuttle *Challenger*, and the medical staff who warned of potential problems with silicone-gel breast implants.

Oftentimes, the dilemma is not as clear-cut as this. Sometimes the organization simply wishes to limit the amount of information provided to an audience concerning a particular risk. How much information is the right amount? Which pieces will the audience feel are necessary? When faced with such dilemmas, the communicator really has three choices: follow organizational dictates, step down from the work in question, or find someone who will recognize the problem and give it the attention it deserves. Sometimes this person is a higher level manager within the same organization (and we encourage you to try this avenue first if at all possible). Sometimes it is an outside agency with oversight over your organization. If all else fails, you can turn "whistleblower" and tell your story to the media. This may make you a celebrity in the short run; however, despite laws that stipulate no harassment of whistleblowers, telling your story to the press may have disastrous results for your career. Organizations take a dim view of those who break corporate dictates, however justifiably.

SUMMARY

This short discussion has covered only a few of the ethical issues that can face those who are communicating risk. Many more might be added. Being aware of these issues and how they might be resolved can help those who are communicating risk meet the challenges of communicating in an ethical manner.

REFERENCES

Beck, J. E. 1991. "Public Involvement through Negotiation, Mediation, and Arbitration." Seminar presented to staff, November 25, 1991, Pacific Northwest National Laboratory, Richland, Washington.

Bennett, P. and K. Calman. 1999. *Risk Communication and Public Health*. Oxford University Press, New York.

Boiarsky, C. 1991. "Writing for Multiple Readers with Conflicting Needs: An Opportunity for Improving Communications with Regulatory Agencies." In *The Engineered Communication: Designs for Continued Improvement, Proceedings of the 1991 International Professional Communication Conference*. Institute of Electronic and Electrical Engineers, Washington, DC, pp. 313–317. 91CH3067-4.

Bullard, R. D. 1990. *Dumping in Dixie: Race, Class, and Environmental Quality*. Westview Press, Boulder, Colorado.

Bullard, R. D. 1992. “In Our Backyards: Minority Communities Get Most of the Dumps.” *EPA Journal*, 18 (1): 11–12.

Cartlidge, E. 2014. “Updated: Appeal Court Overturns Manslaughter Convictions of Six Earthquake Scientists.” Science, November 10, 2014. http://www.sciencemag.org/news/2014/11/updated-appeals-court-overturns-manslaughter-convictions-six-earthquake-scientists (accessed August 7, 2017).

Center for Biosecurity. 2012. *After Fukushima: Managing the Consequences of Radiological Release*. University of Pittsburgh Medical Center, Baltimore, Maryland.

Creighton, J. 1992. “What Does It Take for a Decision to ‘Count’?” Presentation to U.S. Department of Energy, Richland Operations Office, Richland, Washington. Creighton and Creighton, Palo Alto, California.

Dozier, D. M., L. A. Grunig, and J. E. Grunig. 1995. *Manager’s Guide to Excellence in Public Relations and Communication Management*. Lawrence Erlbaum Associates, Mahwah, New Jersey.

Flynn, J., P. Slovic, and H. Kunreuther, eds. 2001. *Risk, Media, and Stigma: Understanding Challenges to Modern Science and Technology*. Earthscan, London.

Gregory, R. S. and T. A. Satterfield. 2002. “Beyond Perception: The Experience of Risk and Stigma in Community Contexts.” *Risk Analysis*, 22 (2): 347–358.

McCallum, D. B. 1995. “Risk Communication: A Tool for Behavior Change.” *NIDA Research Monograph*, 155: 65–89.

Morgan, M. G., B. Fischhoff, A. Bostrom, and C. J. Atman. 2002. *Risk Communication: A Mental Models Approach*. Cambridge University Press, New York.

NRC (National Research Council). 1996. *Understanding Risk: Informing Decisions in a Democratic Society*. National Academy Press, Washington, DC.

STC (Society for Technical Communication). 1998. “Ethical Principles for Technical Communicators.” https://www.stc.org/about-stc/ethical-principles/ (accessed October 15, 2017).

Union of Concerned Scientists. 2012. “Science in an Age of Scrutiny: How Scientists Can Respond to Criticism and Personal Attacks.” Cambridge, MA. http://www.ucsusa.org/sites/default/files/legacy/assets/documents/scientific_integrity/science-scrutiny.pdf (accessed August 7, 2017).

ADDITIONAL RESOURCES

Chess, C., P. M. Sandman, and M. R. Greenberg. 1990. *Empowering Agencies to Communicate about Environmental Risk: Suggestions for Overcoming Organizational Barriers*. Rutgers University, Cook College, Environmental Communication Research Program, New Brunswick, New Jersey.

Covello, V. T., D. B. McCallum, and M. T. Pavlova. 1989. “Principles and Guidelines for Improving Risk Communication.” In V. T. Covello, D. B. McCallum, and M. T. Pavlova, eds., *Effective Risk Communication: The Role and Responsibility of Government and Nongovernment Organizations*. Plenum Press, New York, pp. 3–16.

Gelobter, M. 1992. “Expanding the Dialogue: Have Minorities Benefited . . . ? A Forum.” *EPA Journal*, 18 (1): 32.

Kasperson, R. E. 1986. “Hazardous Waste Facility Siting: Community, Firm, and Governmental Perspectives.” In R.E. Kasperson, ed., *Hazards: Technology and Fairness*. National Academy of Engineering/National Academy Press, Washington, DC, pp. 118–144.

Morgan, M. G. and L. B. Lave. 1990. “Ethical Considerations in Risk Communication Practice and Research.” *Risk Analysis*, 10 (3): 355–358.

Presidential Commission for the Study of Bioethical Issues. https://bioethics.archirve.georgetown.edu/pcsbi/node/851.html (accessed August 22, 2017).

6

PRINCIPLES OF RISK COMMUNICATION

The risk communication literature discusses a number of principles regarding how best to communicate risk. Two principles that have been covered extensively are the fact that the audience must find the communicating organization credible and trustworthy and that the audience must be allowed to participate in the risk management decision. Because following both of these principles is often outside the control of those who are communicating the risk, we will not discuss them here.

The risk communication literature discusses a number of principles regarding how best to communicate risk. Two principles that have been covered extensively are the fact that the audience must find the communicating organization credible and trustworthy and that the audience must be allowed to participate in the risk management decision.

Another important principle that is often outside the control of the risk communicator is that actions, policies, and language must be congruent for risk communication to succeed. One of the most disastrous examples of a mismatch in this area is the British government's handling of the mad cow disease outbreak in

Risk Communication: A Handbook for Communicating Environmental, Safety, and Health Risks,
Sixth Edition. Regina E. Lundgren and Andrea H. McMakin.
© 2018 The Institute of Electrical and Electronics Engineers, Inc., and Regina E. Lundgren
and Andrea H. McMakin. Published 2018 by John Wiley & Sons, Inc.

the 1990s. Various ministers attempted to curb public concerns by expressing supreme confidence in the beef industry, yet at the same time failed to ensure that policies were implemented to reduce the risk (Leiss and Powell 2005). Another lesson learned from this incident is that an organization that only appears to act under pressure will increase public hostility levels and make risk communication much more difficult (Bennett and Calman 1999).

The following principles, then, focus on those aspects of risk communication that are within the purview of those who are communicating risk: the principles related to the risk communication process, risk communication presentation, and risk comparison. Unless specifically noted, these principles apply equally to care, consensus, and crisis communication. For more information on risk communication principles, consult Resources at the back of the book.

PRINCIPLES OF PROCESS

Principles of process relate to the process of planning and conducting a risk communication effort. They are ways of setting up the risk communication process that help ensure the effort achieves its objectives.

Know Your Communication Limits and Purpose

To effectively communicate risk, you must know why you are communicating and any limitations to your ability to communicate risk. Your communication limits may be defined by the following:

- **Regulatory requirements.** For example, the U.S. Environmental Protection Agency specifies what community relations activities are to be conducted for Superfund clean-up sites (see Chapter 3).
- **Organizational requirements.** For example, some organizations cannot allow preliminary risk data to be released for proprietary reasons (see Chapter 4).
- **Audience requirements.** For example, some members of the audience may have difficulty in reading or processing information (see Chapter 4).

These kinds of limits affect how you can communicate risk.

Another way to think about this principle is "don't promise what you can't deliver." Define the audience's role at the beginning of the process and frequently thereafter so that both the audience and your organization know what to expect. If you and your audience understand why you are communicating

> Define the audience's role at the beginning of the process and frequently thereafter so that both the audience and your organization know what to expect.

about the risk and the limits to that communication, you will be less likely to promise what you cannot deliver, and they will be less likely to demand a bigger role than they can legally have. See Chapter 7 for more information on setting purposes and determining limits.

Violating this principle can increase hostility in the audience, making it more difficult for the organization to communicate credibly and effectively. An example comes from one of the U.S. Department of Energy's defense production laboratories (those laboratories whose research has focused on better ways to produce nuclear weapons). A group of citizens who lived in the area near the laboratory was concerned about the risk of having nuclear materials so close and distressed that their local economy was driven by making better bombs. They petitioned for and received funding from a philanthropical organization to study alternative uses for the laboratory. The communication process between the laboratory and the concerned citizens had never been good; suspicion was strong on both sides. However, even as the laboratory had begun to communicate risk more effectively, opening its doors to tours and inviting comments on activities, the citizens group was trying to identify ways to change the laboratory, with no input from the laboratory or the U.S. Department of Energy. When the citizens group comes up with its recommendations, will anyone listen? And if the recommendations fail to gain the hearing the group feels is deserved, what kind of communication will be possible then? In a situation like this, it would have been best if the laboratory and the U.S. Department of Energy had gone to the citizens' group as soon as the grant was received and discussed what options were possible given the department funding and mandate. With expectations set, the group could have developed strategies within existing constraints.

Whenever Possible, Pretest Your Message

Audience analysis should be part of every effort to communicate risk. Factors such as reading level, knowledge of the subject, and level of hostility must be considered if risk is to be communicated effectively. Whenever possible, however, the message should also be pretested, reviewed by a group representing the intended audience, before dissemination, to determine that the audience analysis information was correct and that the risk message achieves the desired results.

Pretest even before the message is designed by asking your potential audience about issues to be covered, concerns to be addressed, and levels of information needed. Pretest the risk communication message prototype before dissemination to make sure that you have addressed the concerns and are not alienating anyone with the presentation. Test between communication rounds so that you can build on your efforts and refine them (Arkin 1989). More information on pretesting is presented in Chapter 8.

Communicate Early, Often, and Fully

This principle has two aspects: timing of communication and amount of information released. Risk communication must be timed to involve the audience throughout the process, not only during a crisis or once in the life of a project. As mentioned previously (see Chapter 5), many members of the audience will expect to be involved from the beginning. In fact, many will consider such involvement as their right. Denying them this opportunity will increase hostility and make risk communication more difficult.

Therefore, risk communication should begin as soon as a risk has been identified and continue as new information becomes available. If no new information becomes available in a timely manner, let the audience know that the risk is still being studied and that they have not been forgotten. The length of time between communications will vary by risk and level of interest from the audience. A risk that seriously threatens entire communities and has the audience extremely concerned will require more frequent communications (hourly to daily, as in a flood) than will a risk that results in less immediate danger to an audience that is unconcerned (quarterly to yearly).

> If no new information becomes available in a timely manner, let the audience know that the risk is still being studied and that they have not been forgotten.

The second aspect involves the amount of information released. As noted in Chapter 4, many organizations find it difficult to release information about a risk because of national security or proprietary concerns. However, withholding information, even to confirm the accuracy of the data, can make the audience suspect that the organization is trying to hide something, eroding its credibility, increasing hostility, and generally making risk communication more difficult. Therefore, do not restrict information. When in doubt, ask your audience what level and type of information they want and provide as much of it as you can within organization and resource constraints.

An example of how this principle has been implemented comes from the New York City Department of Health officials. When the West Nile virus outbreak hit in 1999, they developed a detailed response plan that allowed them to communicate early. To enable them to communicate often, they also used multiple communication channels (including TV and radio public service announcements), extensive media outreach and announcements during daily mayoral press conferences, brochures and fact sheets prepared in 10 languages, posters placed throughout the city, bill inserts mailed with the cooperation of city utilities, hotlines staffed around the clock, a website, and townhall public meetings. To ensure that they were communicating fully, they provided information that answered peoples' questions, explained protective measures that people could take to reduce their risk, and described what the city was doing. As a result, communication efforts went more smoothly than what might otherwise have been the case (Covello et al. 2001).

Case Study: Failure to Follow Up Can Be Costly

In July 2014, in an attempt at care communication to meet legal requirements, the Limestone County Water and Sewer Authority in Alabama issued a letter to local citizens concerning levels of haloacetic acids, a disinfectant by-product, above drinking water standards in tap water at two locations in the county. The agency then installed automatic flushers, cleaned the lines, and removed the problem. The issue? No one let the local schools know.

The letter, which was issued in all capital letters, explained the elevated results, pinpointed the locations, and stressed that there was no immediate risk. However, the only action specified in the letter was to "Please share this information with all the other people who drink this water, especially those who may not have received this notice directly (for example, people in apartments, nursing homes, schools, and businesses). You can do this by posting this notice in a public place or distributing copies by hand or mail." Someone kindly posted the notice on the front doors of Johnson Elementary School.

When the staff returned from summer break, school officials found the notice and immediately took action. They purchased bottled water to distribute to students and bought large canisters of water to use as water stations around the school. They also sent a recorded message to the parents of all 320 students at the school to let them know the steps that were being taken to safeguard their children.

Agency representatives had to deal with phone calls from concerned parents and questions from reporters interested in covering the story about water contamination in the schools. Again and again, officials stressed that the problem had been resolved. Meanwhile, the superintendent of schools insisted that precautionary measures would continue to be taken until the school was notified directly that everything was safe.

Alerting citizens about potential dangers in drinking water was well within the agency's charter, and sending the alert early could have helped avoid any possible exposure. However, asking the local citizens to post, hand-deliver, or mail notices and then failing to follow up, especially with vulnerable populations in places such as schools and nursing homes, only served to raise hostility levels and increase costs for unnecessary mitigation measures.

Be the Expert

When faced with a risk, people often search for more information, scanning brochures and articles, watching television news, talking with their friends and neighbors, and joining in social media chatter, among other options. Whether care, consensus, or crisis communication, they frequently seek out sources they view as credible subject matter experts. If your organization is charged with communicating about a particular risk, you want to be that expert.

Being the expert allows you to share accurate, timely, risk information; encourage those at risk to take appropriate action to protect themselves; and follow up on questions and concerns. As the U.S. Centers for Disease Control and Prevention states in its excellent *Crisis and Emergency Risk Communication Manual*, "Be first, be right, be credible" (Reynolds and Seeger 2014).

For information on choosing a spokesperson, see Chapter 15.

Remember That Perception Is Reality

This principle can be difficult for some technical experts to apply. To them, reality is built on carefully constructed, tested, scientific truths, not someone's possibly uninformed perceptions. However, such regulatory agencies as the U.S. Environmental Protection Agency sometimes make decisions based heavily on the audience's perception, not just on the technical aspects.

Case Study: Arguing with Perception Can Be Futile

To stop the deadly spread of dengue fever in the Philippines, the country's Department of Health instituted a vaccination program for children, inoculating more than 800,000 children over a 2-year period. Unfortunately, the vaccines had not been approved by the World Health Organization and actually made the disease worse in some cases. Nearly 60 deaths have been blamed on the vaccine at the time of this writing. Grieving parents demanded to know why the vaccine had proven fatal. Concerned parents of the other vaccinated children demanded to know more about long-term effects. The pharmaceutical company vowed to shoulder responsibility for any death proven through scientific evidence to have been caused by the vaccine (Ramos-Araneta 2018).

The beleaguered department developed posters about the vaccination program and potential effects of the vaccine, placing them in every school classroom. The poster even stated that the Department of Health would monitor children on its list and explained how to put a child's name on the list for monitoring.

It wasn't enough. Parents brought a petition to the Supreme Court, demanding that the department and other agencies associated with the program provide long-term health monitoring and treatment for their children, for free. They wanted more information about what was happening. The court asked the department to comment on the petition. The department's response indicated that everything that could be done was being done. They felt they were doing a perfectly fine job of risk communication.

Perception is reality. The department had developed and implemented a risk communication plan it felt met the needs of the intended audience—the parents of the children affected by the vaccine. The parents, however, felt they lacked key information and resources to protect the health of their children. A more open, transparent process of vaccine development, distribution, and long-term monitoring, with stakeholder involvement, might have helped build trust and resulted in a better vaccine and wider implementation.

For example, at a garbage dump near Spokane, Washington, dangerous chemicals had the potential to leak into the groundwater and from there to the drinking water supply. A scientific study of alternative treatment methods recommended the use of capping, that is, pouring cement over the dump and monitoring it to ensure that nothing

The moral: Risk assessments and subsequent decisions are not based on the technical aspects of the risk alone. Audience perceptions and concerns must be considered if risk decisions, and their communication, are to be successful.

leaked out, as the most cost-effective treatment. However, during the public review of the study and recommendations, the public overwhelmingly preferred the alternative of pumping out some waste, treating the remaining waste, and then capping. Although this alternative did not significantly lessen the risk and significantly increased the cost, it was the alternative chosen by the U.S. Environmental Protection Agency. *The moral:* Risk assessments and subsequent decisions are not based on the technical aspects of the risk alone. Audience perceptions and concerns must be considered if risk decisions, and their communication, are to be successful.

PRINCIPLES OF PRESENTATION

Another set of principles addresses how to present the risk information in ways that best communicate the risk to the intended audience.

Know Your Audience

You cannot communicate unless you know to whom you are communicating. This is the one principle you should always follow; if you follow it, you will be in a position to know how to apply any of the other principles. In fact, knowing your audience is crucial to knowing what risk communication methods to use. For example, if you know that your audience wants to see the risk information immediately, you might forego the principle of pretesting so that you can release the information quicker. And you might use the method of informing the news media rather than using a method that could take longer (such as holding a public meeting 30 days after announcing it in the paper). For more information on this issue, see Chapter 8.

> You cannot communicate unless you know to whom you are communicating. This is the one principle you should always follow; if you follow it, you will be in a position to know how to apply any of the other principles.

Do Not Limit Yourself to One Form or One Method

Any audience for a risk communication message will be made up of a variety of segments, each with different levels of knowledge about the risk, interest in the risk, and being at risk. Because of these factors, no single method of communication is likely to meet the needs of your entire audience. You will need to find methods that best meet the needs of each segment. For example, in a community near a Superfund site in Alaska, we found that the written word was the best approach for a large segment of the population because other forms of communication (radio and television) were subject to outages during inclement weather, and the library was the one place almost everyone eventually visited. For those in more rural areas, who came into town only for major community events such as fairs, we also developed a traveling exhibit. See Chapter 10 for more information on which methods best serve which segments of the audience.

Simplify Language and Presentation, Not Content

When trying to communicate the complex issues behind a risk, it is easy to leave out information that seems to be overly technical. Unfortunately, by simplifying the content of a risk message, you may leave out key information that your audience would need to make a decision. Your audience will understand the concepts better, and be better informed about the risk, if you simplify the way you present the content instead of the content itself. Any technical subject can be understood by the public if it is presented properly. Technical communicators have made careers out of this fact. The audience does not have to understand it at the same level as the risk expert, but they can understand it well enough to make an informed decision.

Be Objective, Not Subjective

Quantify information whenever possible. Avoid words such as “significant,” “negligible,” and “minor.” They beg the questions, “Significant to whom? Under what conditions? Based on what evidence?” Whenever possible, give examples, numbers that can be put in perspective, and concrete information.

Communicate Honestly, Clearly, and Compassionately

To communicate honestly, you must differentiate between opinions and facts. Any risk communication message, whether spoken, written in a report, broadcast over the Internet, or printed on a poster, can be questioned by the audience. Responding credibly to a question about a fact is much easier than substantiating an opinion.

To communicate clearly, you must present information at your audience’s level of understanding. Audiences reject information that is too difficult for them, either by refusing to acknowledge it or by becoming hostile. On the other hand, audiences may become hostile when information is too easy for them because they feel patronized.

To communicate compassionately, do not ignore audience concerns, even ones that seem to be based on information about something other than the risk itself. A scientist we once worked with was wonderful about listening to his audience. He attended every public meeting, pored over letters and comments, and carefully categorized every comment. Unfortunately, he then identified groups of comments that he felt were ridiculous: “That’s a stupid comment, I won’t sink to that level to answer it. This one is clearly out of scope, it doesn’t have anything to do with the risk. This comment is purely emotional.”

The audience's concerns will not go away simply because you refuse to deal with them. On the contrary, they will likely keep coming up until you are forced to deal with them, perhaps under less favorable conditions such as a lawsuit. It is better to deal with them as soon as they are aired, show your audience that you are listening, and allow them to move on to other questions that may more directly involve the risk itself. How you deal with them depends on the risk communication method. In print messages and technology-based applications, use a question-and-answer format with the questions being their concerns and the answers your responses, or incorporate your responses into a graphic. In face-to-face methods and stakeholder participation, respond directly to questions and concerns as you hear them.

Listen and Deal with Specific Concerns

Besides dealing with the emotions behind concerns, listen to what people are saying about the risk itself. Then deal with each specific concern you hear. Do not discount concerns that seem to be based on faulty scientific information or are peripheral to the situation. A good example comes from a scientist who was asked to speak about atmospheric fallout at a public meeting. After explaining the process and associated risks, the scientist asked if there were any questions. A man from the back of the room rose and identified himself as a local farmer: "You tell me that I have this plutonium stuff all over my crops. What exactly does that mean? Can I still sell my crops? Can I eat them myself? Should I let my children play outside? I don't know who to trust anymore!" The scientist responded, "Excuse me, sir, but it's strontium-90, not plutonium."

Besides dealing with the emotions behind concerns, listen to what people are saying about the risk itself. Then deal with each specific concern you hear. Do not discount concerns that seem to be based on faulty scientific information or are peripheral to the situation.

Now, the scientist was just trying to correct a technical mistake. However, as you can imagine, the level of hostility in that room skyrocketed. No one listened to anything else the scientist had to say. It would have been far more effective for the risk communication process if the scientist had recognized the underlying confusion and fear and said something like, "I understand why you might not know where to turn. There's a lot of information out there, but there's also a lot of misinformation. Let's see what I can do to clarify a few points. For one thing, it's not plutonium, it's strontium-90, and what that means is. . . ."

Convey the Same Information to All Segments of Your Audience

As mentioned previously, different segments of your audience will have different needs—for information, for involvement, and for responding to the risk. To communicate effectively, you must communicate with each segment in a way that meets those needs. However, as Callaghan (1989) found, you can change the method and amount of detail, but you cannot change the basic information or you will lose trust and your efforts will be useless. You must provide the same information to each segment to retain credibility.

Deal with Uncertainty

In communicating about risks, beware of presenting results as definitive. No study is ever the final word. Instead, discuss sources of uncertainty, such as how the data were gathered, how they were analyzed, and how the results were interpreted. The sources of uncertainty and how you communicate about them vary among care, consensus, and crisis risk assessments.

In care communication situations, the risk assessment has been conducted and found to be credible by most of the audience. Sources of uncertainty, then, are less important and may be discussed very little if at all. However, in cases where a segment of the audience disagrees with the risk assessment results, for example, when parents disagree about having their children vaccinated, dealing with the underlying concerns may be more effective than dwelling on uncertainties.

In consensus communication, the audience will probably be involved in determining how the risk is analyzed and may help determine which types of uncertainty are acceptable. Therefore, sources of uncertainty become well understood and may be discussed less and less as time goes on.

In some types of crisis communication, the risk is obvious, and the areas of uncertainty can be left out of messages unless a particular audience has requested them. In other types of crisis communication, for example, in a terrorist attack, the risk and final consequences may be less well defined. In such cases, the uncertainty may lie in our response to the crisis. Risk communicators must be open with what they do not know and stress what they do know and what they are doing to resolve the uncertainties.

> The research on risk communication provides insights into the utility of risk comparisons. They can be useful but only when they are a part of an overall communication strategy. This strategy requires that the communicator: understand the nature of the risk—both the hazard that it presents and the qualitative attributes that influence perception by the target audience; understand the audiences that are being addressed and their relationship to the hazard; understand how the risk comparison interacts with other components of the message; and have a way to evaluate the audiences' response.
> —David B. McCallum and Susan Santos, special paper to support the Commission (1997, p. 212)

In cases where uncertainty is to be discussed, the process of assessing the risk should be discussed first to frame where the sources of uncertainty can be found. In data gathering for an environmental risk assessment, for example, were the data gathered over the same time period, or are you comparing between years? Were the same collection methods used each time? Were the data always gathered in the same location? In data analysis for a safety risk assessment, which methods were used? How reliable are they? Are they new innovations or methods that have stood the test of time? For interpreting the results of a health assessment, what was the basis for determining significance? How certain are the standards or limits used? Who determined whether these standards protected human health?

Your audience will often want the answer to one particular question, "Is it safe?" Although they may not like answers with caveats attached, they will be even less happy if they are given an answer that later turns out to be wrong because of the uncertainties involved. See Chapter 14 concerning the visual representation of risk for more information on portraying uncertainty and probability.

Address Misinformation

This may be one of the most difficult principles to apply, as it is so context dependent. Hazards in everything from care communication situations, such as the use of recreational marijuana, to crisis communications, such as those involving evacuations, engender strong opinions and facts that justify those opinions. Who's to say which is misinformation? Especially during consensus communication, debating these facts can be part of the risk communication process. In addition, some research suggests that any attempt to counter misinformation may have unintended consequences and even reinforce misinformation (see, for example, Pluviano et al. 2017). However, when incorrect information is presented that could increase risk or decrease credibility for an organization or its partners, risk communicators may be encouraged to address it.

Addressing misinformation can only be effective if built on a foundation of trust and credibility. Those at risk accept information from sources they believe both care about them and have the knowledge to understand the risk better than they do. Perceived shared values are also important. For example, petroleum engineers are no doubt experts in the hazards posed by an oil spill, but their connection to the company spilling the oil make it less likely the public downstream of the spill will find them credible in sharing risk information, particularly if it is the spill that is portrayed as less harmful than the public expects.

Likewise, misinformation can only be countered effectively after listening and dealing with specific concerns (see previous principle in this section). What underlies the misinformation? Fear? A desire for more control? Simply providing more facts is unlikely to be an effective strategy in such cases. The underlying concerns must be addressed first.

Some strategies have proven effective in specific cases. Start by addressing what you can. If you have more accurate information and are a trusted source, share what you know following risk communication best practices. Depending on the source of the misinformation, you may or may not be successful in countering it, but at least your audience will have the information. For example, during the

Ebola outbreak in 2014, some local public health departments in the United States took on the role of countering misinformation. They disseminated accurate risk information and addressed rumors on social media. They also trained staff, from those answering phone calls to the chief epidemiologist tracing contacts, in risk communication (Bevington et al. 2015).

Keep actions consistent with messages. If your message seeks to reassure but your actions suggest a greater urgency or level of harm, your audience is more likely to believe messages that align with danger. For example, when dirt caved in over an old tunnel at one of its nuclear waste cleanup sites, the U.S. Department of Energy quickly moved to assure a worried public that no radiation had escaped. They also requested that the Federal Aviation Administration announce a “no fly zone” over the area out of an abundance of precaution. People hundreds of miles away assumed that meant a radioactive cloud had risen thousands of feet into the air and was heading their way. No amount of reassurance could convince them otherwise.

Give them something to do. One of the reasons misinformation is bandied about is that people want to control a situation over which they may have little control. If they hear of a treatment for a condition they have been told is untreatable, they may try it. If they learn of a way to ride out an impending hurricane without having to evacuate, they’ll do it. Offer them a way to help mitigate the risk that is concrete, specific, and easy to achieve (little time, money, and knowledge), and they are likely to take it.

PRINCIPLES FOR COMPARING RISKS

In risk communication efforts, comparing risks can be helpful but challenging. As you try to present information at a level that your audience understands, comparisons look like an easy answer. Unfortunately, the empirical research devoted to this area is complicated, confusing, and contradictory (see, for example, Johnson 2002, who provides a frank discussion of compounding influences). Much of the advice that follows is based on informed opinions of risk communication researchers and practitioners. The best way to choose which of these principles or methods to apply is to know your audience and pretest messages.

Risk communication researchers and practitioners agree that some types of comparisons can alienate certain segments of the audience. Unfortunately, which comparisons are best for which audiences are yet to be determined. Covello et al. (1988) listed ways to compare risks according to which methods might be most acceptable with most audiences (Table 6.1). However, studies at Carnegie-Mellon University and elsewhere (for example, Roth et al. 1990) have shown that some of these methods may in fact be more acceptable to certain audiences than Covello et al. originally thought.

Table 6.1. Acceptability of Risk Comparisons

Most acceptable	Less desirable	Even less desirable	Rarely acceptable
Same risk at different times	Doing something versus not doing it	Average risk versus peak risk at a particular time or location	Risk versus cost
Risk versus standard	Alternative ways of lessening risk	Risk from one source of harm versus risk from all sources of that harm	Risk versus benefit
Different estimates of the same risk	Risk in one place versus risks in another place	Occupational risk versus environmental risk	Risk versus other specific causes of same harm

Adapted from Covello et al. (1988).

Use Analogies, but Do Not Trivialize

According to the Commission (1997) and our own experience, most people, including physicians and some risk assessment experts, do not easily relate to terms such as 10^{-6} or E-6 when describing risk. Analogies can help put these risks in perspective. For example, a risk of one in a million (10^{-6}) is equivalent to 30 seconds in a year, 1 inch in 16 miles, or 1 drop in 16 gallons (Commission 1997).

Using analogies, however, can be problematic for several reasons. One reason is that risk is such a multifaceted situation that it is difficult to find something completely analogous with which to compare it. For example, the analogies discussed in the previous paragraph, while endorsed by the Presidential/Congressional Commission, deal with volume or distance, not toxicity, and may in fact confuse some of the audience.

Analogies can help put risks in perspective. For example, a risk of one in a million is equivalent to 30 seconds in a year, 1 inch in 16 miles, or 1 drop in 16 gallons (Commission 1997).

Another reason analogies can be problematic is that they can come across as trivial. As you try to compare a technical concept of risk to something that is more familiar to your audience, it is easy to find something that may look too simplistic. For example, you might say that the risk of contracting cancer from being exposed to a certain chemical is as small as one piece of toilet paper in a roll stretched from New York to San Francisco. This does present the concept that the risk is very small, but you seem to have compared someone's life to a roll of toilet paper, a comparison that will offend at least some if not all members of your audience.

Use Ranges

You can express a risk using a range of numbers. (Unfortunately, some studies show that this can be problematic; again, know your audience.) One end of the range may represent a level that has been determined to be "safe," the other end may represent a level that has been determined to be risky, and another number may represent the findings of your risk assessment. Audiences can then compare your risk assessment findings with those in the range. This method of risk comparison is especially good for hostile audiences in that your audience can determine for themselves where the risk falls on a hazard scale, and you do not have to decide "significance" for them, a practice that can lead to increased hostility. However, be careful to explain the ranges—why they were chosen, by whom, and what they mean to your audience. This further explanation helps put the risk in perspective.

Compare with Standards

A number of standards have been developed by regulatory agencies and interested groups to describe levels at which certain risks can cause certain levels of harm. One of the most often used at Superfund sites, for example, is the National Primary Drinking Water Regulations mandated by the U.S. Environmental Protection Agency. These standards show what level of contaminant is considered safe in drinking water supplies. You could compare the results of your risk assessment with such a standard. If your results are higher than the standard, you are showing your audience that they should be concerned. If your results are lower than the standard, you are showing your audience that they probably have no reason for concern. One caution, however, is that recent studies have shown that this rule is only as good as the standard used. If your audience already feels that the standard is too low or high, comparing with it may not be your best choice.

Compare with Other Estimates of the Same Risk

For any particular risk, a number of assessments are usually performed. For example, government researchers, university researchers, and independent researchers hired by concerned citizen groups may all study a risk. In addition, some risks have been studied by the same organization over many years. You can compare the results of each of the studies. If the results are similar, you are reinforcing the risk assessment. If the results vary widely, you are reinforcing recognition of the uncertainties involved. This type of comparison has been called "dueling Ph.D.s," which points to a possible problem. If having too many studies or contradictory studies will confuse or alienate your audience ("I knew it—these scientists will say anything!"), you may want to try another way of comparing the risk.

Compare Traits

Another way to compare risks is to base the comparison on different traits of segments of your audience. Use age groups (risk to infants versus risk to senior citizens), geographic regions (risk on the East Coast versus risk on the West Coast), or lifestyles (risk to the avid sportsman versus risk to the farmer; risk to the farmer versus risk to the city dweller). This personalizes the risk for each member of your audience by allowing them to determine which trait best applies. Those at lesser risk may find this determination comforting. Those at greater risk may be motivated to find ways to decrease their risk.

Do Not Compare Risks with Different Levels of Associated Outrage

The term outrage refers to the feelings of anger and frustration often associated with certain risks. (For a more in-depth discussion, see Chapter 4.) Risks that are high in outrage include those that are imposed, government controlled, seen as unfair by the audience, from an untrustworthy source, artificial, exotic, associated with disasters, dreaded, undetectable, or not scientifically well understood. Nuclear power is a prime example of a high-outrage risk, being imposed, government controlled, artificial, exotic, associated with disasters like those at Chornobyl and Fukushima, dreaded, undetectable (the radiation is), and relatively new. In contrast, smoking cigarettes is voluntary, familiar, detectable, and scientifically well understood, so outrage is generally lower. The reasoning behind this principle is that when you compare something like the high-outrage risk of contracting cancer from radiation exposure from nuclear power to the low-outrage risk of contracting cancer from smoking cigarettes, you alienate your audience. Your audience will see the two as totally different risks, having nothing to do with each other.

However, studies at Carnegie-Mellon University (Roth et al. 1990) indicate that some audiences will not be alienated by such comparisons. They will, in fact, learn from such comparisons and even find them comforting, if the high-outrage risk they were concerned about is lower than the low-outrage risk. Unfortunately, the research has not delineated exactly which audiences these are. So, for now, it is probably best to avoid comparing high-outrage and low-outrage risks.

Explain Reductions in Magnitude

One of the common misperceptions among those at risk is that a reduction in magnitude (one chance in a thousand to one chance in a million) is the same as a linear reduction (10,000 to 9999). Although research in this area is quite complicated, one suggestion is to illustrate this concept graphically. The Commission (1997) recommends bar charts to show the radical differences between these scales. See Chapter 14 for additional information on visual representation of risk.

Other research from the University of New South Wales suggests that magnitude can best be understood in a broader context. In 400 experiments with a mostly student population, researchers found that the more risk information students received about the recent weather-related disasters in a hypothetical village, the more likely the students were to agree to live in that village. The conclusion was that communicating long-term trends to show accumulation of events and their increase in risk across time may be more effective in communicating magnitude (Newell et al. 2016). Researchers suggest reminding people how many events occurred between specific points of time, say "eight events between 2001 and 2017."

SUMMARY

Risk communication is still far from being a science. The principles that have been developed through years of study can be distilled into two maxims: know your audience and know your situation. Understand what your audience needs to know (what they want to know and what you need to tell them to help deal with the risk), how they want to receive that information, and what you can do within certain constraints. The other principles can then be followed as they apply to your audience and situation. Part II deals with the issues of audience and situation.

REFERENCES

Arkin, E. B. 1989. "Translation of Risk Information for the Public: Message Development." In V. T. Covello, D. B. McCallum, and M. T. Pavlova, eds., *Effective Risk Communication: The Role and Responsibility of Government and Nongovernment Organizations*. Plenum Press, New York, pp. 127–135.

Bennett, P. and K. Calman. 1999. *Risk Communication and Public Health*. Oxford University Press, New York.

Bevington, F., L. Kan, K. Schemm, and C. Aldridge. 2015. "Ebola as a Case Study: The Role of Local Health Departments in Global Health Security." *Journal of Public Health Management and Practice*, 21 (2): 220–223.

Callaghan, J. D. 1989. "Reaching Target Audiences with Risk Information." In V. T. Covello, D. B. McCallum, and M. T. Pavlova, eds., *Effective Risk Communication: The Role and Responsibility of Government and Nongovernment Organizations*. Plenum Press, New York, pp. 137–142.

Commission (Presidential/Congressional Commission on Risk Assessment and Risk Management). 1997. *Risk Assessment and Risk Management in Regulatory Decision-Making*, Vol. 2. Commission on Risk Assessment and Risk Management, Washington, DC.

Covello, V. T., P. M. Sandman, and P. Slovic. 1988. *Risk Communication, Risk Statistics, and Risk Comparisons: A Manual for Plant Managers*. Chemical Manufacturers Association, Washington, DC.

Covello, V. T., R. G. Peters, J. G. Wojtecki, and R. C. Hyde. 2001. “Risk Communication, the West Nile Virus Epidemic, and Bioterrorism: Responding to the Communication Challenges Posed by the Intentional or Unintentional Release of a Pathogen in an Urban Setting.” *Journal of Urban Health: Bulletin of the New York Academy of Medicine*, 78 (2): 382–391.

Johnson, B. B. 2002. “Stability and Inoculation of Risk Comparisons’ Effects under Conflict: Replicating and Extending the ‘Asbestos Jury’ Study by Slovic et al.” *Risk Analysis*, 22 (4): 777–788.

Leiss, W. and D. Powell. 2005. *Mad Cows and Mother’s Milk: The Perils of Poor Risk Communication*, 2nd ed. McGill-Queen’s University Press, Montreal, Quebec, Canada.

Newell, B. R., T. Rakow, E. Yechiam, and M. Sambur. 2016. “Rare Disaster Information Can Increase Risk-Taking.” *Nature Climate Change*, 6: 158–161.

Pluviano, S., C. Watt, and S. Della Sala. 2017. “Misinformation Lingers in Memory: Failure of Three Pro-Vaccination Strategies.” *PLoS One*, 12 (7). DOI: 10.1371/journal.pone.0181640

Ramos-Araneta, M. 2018. “Sanofi OKs payment for vaccine casualties.” Manila Standard, January 23. http://manilastandard.net/news/top-stories/256950/sanofi-oks-payment-for-vaccine-casualties.html (accessed January 29, 2018).

Reynolds, B., and M. Seeger. 2014. Crisis and Emergency Risk Communication, 2014 ed. https://emergency.cdc.gov/cerc/index.asp (accessed July 24, 2017).

Roth, E., M. G. Morgan, B. Fischhoff, L. Lave, and A. Bostrom. 1990. “What Do We Know about Making Risk Comparisons?” *Risk Analysis*, 10 (3): 375–387.

ADDITIONAL RESOURCES

Covello, V. T. and F. W. Allen. 1988. *Seven Cardinal Rules of Risk Communication, OPA-87-020*. U.S. Environmental Protection Agency, Washington, DC.

Covello, V. T., D. B. McCallum, and M. T. Pavlova. 1989. “Principles and Guidelines for Improving Risk Communication.” In V. T. Covello, D. B. McCallum, and M. T. Pavlova, eds., *Effective Risk Communication: The Role and Responsibility of Government and Nongovernment Organizations*. Plenum Press, New York, pp. 3–16.

Hance, B. J., C. Chess, and P. M. Sandman. 1988. *Improving Dialogue with Communities: A Risk Communication Manual for Government*. New Jersey Department of Environmental Protection, Division of Science and Research, Trenton, New Jersey.

Hance, B. J., C. Chess, and P. M. Sandman. 1990. *Industry Risk Communication Manual*. CRC Press/Lewis Publishers, Boca Raton, Florida.

NRC (National Research Council). 1989. *Improving Risk Communication*. National Academy Press, Washington, DC.

II

PLANNING THE RISK COMMUNICATION EFFORT

For any effort to be effective, a certain amount of planning is needed. To plan a risk communication effort, whether a one-time message or a variety of messages for a variety of audiences over a longer time, you need to determine your purpose and objectives, analyze your audience, develop your message, determine the proper method, set a schedule, and pull all these pieces together into a comprehensive plan. Having a risk communication plan can help you focus your efforts and keep all those involved in assessing, communicating, and managing the risk informed so that they can work together as a team.

> Attention to details (e.g., dress, language used in risk communication materials, meeting location, and room arrangement) is often critical to effective risk communication.
> —Vincent T. Covello, David B. McCallum, and Maria Pavlova, (1989, p. 9)

Risk Communication: A Handbook for Communicating Environmental, Safety, and Health Risks, Sixth Edition. Regina E. Lundgren and Andrea H. McMakin.
© 2018 The Institute of Electrical and Electronics Engineers, Inc., and Regina E. Lundgren and Andrea H. McMakin. Published 2018 by John Wiley & Sons, Inc.

7

DETERMINE PURPOSE AND OBJECTIVES

Two variables you must consider in communicating risk are why you are communicating the risk (purpose) and what you hope to gain by it (objective). The purpose is a general statement. It answers "why" questions: Why are we communicating? Why are we educating this group? Why are we trying to build consensus? Objectives are statements of specific, measurable details to be accomplished. Objectives often answer "how" questions: How will we communicate? How often will we communicate? How many messages will we use? For example, if your purpose is to decrease teenage smoking, one of your objectives might be to have 50% of your audience stop smoking by June 15.

When you have determined your purpose and objectives, formalize them by writing them down and by getting concurrence from all those involved in the project, as high up in the organization

Two variables you must consider in communicating risk are why you are communicating the risk (purpose) and what you hope to gain by it (objective).

Risk Communication: A Handbook for Communicating Environmental, Safety, and Health Risks, Sixth Edition. Regina E. Lundgren and Andrea H. McMakin.
© 2018 The Institute of Electrical and Electronics Engineers, Inc., and Regina E. Lundgren and Andrea H. McMakin. Published 2018 by John Wiley & Sons, Inc.

as you can. This formal agreement can help you communicate risk more effectively because it

- gives everyone a common ground on which to build
- lets upper management know why you are doing what you are doing
- gives you a yardstick for measuring success.

When you are determining purpose and objectives, a number of factors should be considered.

FACTORS THAT INFLUENCE PURPOSE AND OBJECTIVES

Your purpose and objectives may at first seem obvious. You are communicating to provide the audience with information they need to make a decision about a risk to their health or safety or the environment. However, your purpose and objectives are necessarily influenced by a number of factors, including legal issues, organizational requirements, the risk itself, and audience requirements. These factors must be consciously considered in determining your purpose and objectives or you may find yourself in conflict with something that could seriously impair, if not cancel, your entire effort. For example, if the purpose and objectives of your risk communication effort at a Superfund site conflict with the communication requirements for these sites mandated by the U.S. Environmental Protection Agency, your organization will be liable for strict financial penalties.

> Your purpose and objectives are necessarily influenced by a number of factors, including legal issues, organizational requirements, the risk itself, and audience requirements.

Legal Issues

Several legal issues may influence your choice of purpose and objectives. Chief among these are the laws that may dictate your risk communication efforts. We describe some of the major U.S. laws and their requirements in Chapter 3. They include the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA); the National Environmental Policy Act (NEPA); and the requirements set forth by the Occupational Safety and Health Administration (OSHA), among others. In addition, many government agencies have policies regarding how risk communication will be conducted or how the public will be involved in risk management decisions.

For example, in late 1992, the U.S. Department of Energy's Office of Environmental Management first issued a policy on public involvement/communication that specified involving the audience fully in decisions related to the environmental cleanup of the department's sites. In 2001, the U.S. Centers for

Disease Control and Prevention issued guidance for risk communication activities as part of multimillion dollar grants to the states. These kinds of requirements must be considered when planning a risk communication effort because they generally provide guidance and sometimes specify activities that must be conducted. If the purpose and objectives of risk communication efforts that fall under these legal requirements differ from what is specified, special arrangements such as legal waivers or exemptions may be necessary.

Organizational Requirements

After considering the legal issues that may affect your efforts, you also need to consider your own organization's requirements and policies regarding the communication of risk, the involvement of the public, the release of information, and the development of communication vehicles and processes in general. The policies may be formal, or they may be in the form of tradition ("we always do it this way").

Check with those in charge of communication in your organization to determine what they expect from risk communication efforts. For example, do they feel that the only proper purpose for communication efforts is to advertise the organization or otherwise make it look good? Is one of their objectives the dissemination of information to key political figures who might be able to influence the future of the organization? You will need to be aware of these issues before you determine exactly what you should do to communicate risk. How you handle their expectations depends on your philosophy concerning the communication of risk. For example, if you agree that promoting the organization should be part of the risk communication effort, then you will include that as a purpose with associated objectives. If you disagree, then you may try to convince those in charge that your audience will want more from a risk communication effort, perhaps by showing how risk communication has helped speed the implementation of projects by avoiding costly and time-consuming legal battles (see Chapter 4 for more information on how this might be accomplished).

> Also consider your own organization's requirements and policies regarding the communication of risk, the involvement of the public, the release of information, and the development of communication materials and processes in general.

The Risk Itself

As mentioned in Part I, your risk communication efforts will probably fall into one of the three categories: care communication (for situations in which the risk is no longer in doubt), consensus communication (for situations in which the audience will help assess and/or manage the risk), or crisis communication (for an immediate risk). Each of these has its own requirements for communication.

Some examples of risks that fall under care communication include the risks from using tobacco, contracting the AIDS virus, and failing to wear protective clothing when handling hazardous materials in the workplace. Most experts agree that these risks are dangerous to human health (although they may disagree about the magnitude or specific exposure routes). When communicating about these risks, it may not be necessary to review the possible dangers, which are usually recognized. The purpose, then, is to alert your audience and provide information that will encourage them to change to less risky behaviors.

Consensus communication involves risks in which the audience and the decision maker must reach an agreement over how the risk will be assessed or managed. Examples include operation of a hazardous waste incinerator, siting of electrical power transmission lines, and cleanup of a Superfund site. Often, no consensus has been reached about what constitutes safe or dangerous levels of exposure or about the acceptability of the risk to those affected by it. The purpose of risk communication in such cases is to build consensus as a basis for making a risk management decision.

Crisis communication relates to those risks brought about by an emergency: a chemical plant fire, an earthquake, or a train derailment. Again, the danger is clearly recognizable. In these situations, there is no time to develop advisory groups to assess ways of dealing with the risk (although such groups may have been involved in the emergency planning process long before the actual crisis). The purpose of crisis communication is to alert your audience to the danger and provide alternatives to minimize the risk.

In addition to your communication type, another consideration in determining your purpose and objectives is the relative newness of the risk and its visibility to your audience (how risky it seems; Figure 7.1). If the risk is relatively new and not very visible, you will have to first raise awareness before you can communicate more technical information, encourage behavior changes, or build consensus. If this risk is something that has been discussed for years and has been visible for some time, the audience may be apathetic, and you may have to find new ways to

Highly visible	Deal with fear, hostility, or other emotional reactions from the audience	Build on audience interest
Little known	Raise awareness in the audience	Share new information
	New	**Old**

Figure 7.1. Primary purpose of risk communication related to newness and visibility of the risk.

awaken audience interest and concern. You might use new information to pique audience interest or present the older information in relation to something your audience is now concerned about. If this risk is relatively new and highly visible, you may have to deal with fear and hostility before effective risk communication can take place. Begin by acknowledging and addressing audience concerns so that the audience can move beyond the fear and hostility to understanding the risk itself.

> Another consideration in determining your purpose and objectives is the relative newness of the risk and its visibility to your audience.

Audience Requirements

The fact that audience requirements are last on the list does not imply that they are the least important. They may in fact be most important because the needs and concerns heavily affect any type of risk communication. Therefore, what the audience wants from you should be among the first things you consider in determining your purpose and objectives.

What does your audience want from the risk communication effort? The specific answer to this question will differ for each effort; however, the question can be answered generally for each category of risk communication. For care communication, your audience generally wants to know about any risks that would prevent their living a good life (enjoyable, long, and worry free) and about how they can minimize those risks. For consensus communication, your audience generally wants to contribute to a decision about how to assess and manage the risk. Depending on how concerned your audience is, they may want to make a larger or smaller contribution. For crisis communication, your audience generally wants to learn how to minimize their risk as quickly as possible. However, after the crisis is over, they may want to know more about how it began.

Another way to look at audience requirements is to consider the relationships between those who are communicating the risk and those who are at risk. Kasperson and Palmlund (1989) present purposes and objectives of risk communication based on relationships such as doctor to patient, employer to employee, and government or private organization to community. Consider the information in Table 7.1 if your risk communication effort is based on

Table 7.1. Risk Communication Purposes Based on Job Relationships

Doctor to patient	Employer to employee	Organization to community
Change behavior	Inform	Encourage involvement in decision making
Increase responsibility for living a healthy life	Motivate to action	Motivate to action

Adapted from Kasperson and Palmlund (1989).

one of these relationships. Also see Chapters 8 and 9 for more information on what the audience likely wants to know about a particular risk.

CHECKLIST FOR DETERMINING PURPOSE AND OBJECTIVES

The purpose and objectives of my risk communication effort are based on the following:

- ☐ Associated legal requirements
- ☐ Organizational requirements for
  - ☐ public involvement
  - ☐ release of information
  - ☐ development of communication vehicles and processes
- ☐ Type of risk communication
  - ☐ Care
  - ☐ Consensus
  - ☐ Crisis
- ☐ Newness of the risk
- ☐ Visibility of the risk
- ☐ Audience requirements
- ☐ Functional relationships between my organization and the audience
  - ☐ Doctor to patient
  - ☐ Employer to employee
  - ☐ Organization to community
- ☐ The purpose and objectives are agreed upon by those involved in the risk communication effort:
  - ☐ Those assessing the risk
  - ☐ Those managing the risk
  - ☐ Those communicating the risk
- ☐ The purpose, objectives, and agreement have been documented

REFERENCE

Kasperson, R. E. and I. Palmlund. 1989. “Evaluating Risk Communications.” In V. T. Covello, D. B. McCallum, and M. T. Pavlova, eds., *Effective Risk Communication: The Role and Responsibility of Government and Nongovernment Organizations*. Plenum Press, New York, pp. 143–158.

ADDITIONAL RESOURCES

Rowan, K. E. 1991. “Goals, Obstacles, and Strategies in Risk Communication: A Problem-Solving Approach to Improving Communication about Risks.” *Journal of Applied Communication Research*, 19: 300–329.

Santos, S. L. 1990. “Developing a Risk Communication Strategy.” *Management and Operations*, 82: 45–49.

8

ANALYZE YOUR AUDIENCE

Whenever we communicate, we make assumptions about our audience. When we talk to our spouses about our children, we can use nicknames and allusions to past behavior because we can assume that our spouses will know the children and situations. When we discuss our jobs with our managers, we assume that they know what we do. When we communicate risk to a broad audience, however, we cannot make such assumptions because the audience can be divided into segments, each with its own characteristics and needs.

With whom are we communicating? Although answering this question is a must in communicating risk (or any information for that matter), some risk communication efforts are still conducted with a total lack of information about the audience. Instead, communication efforts are based on one of two assumptions: either the people we are communicating with are just like us or they are somehow different.

We do not do too badly if the audience really is the same as we are. Scientists generally communicate well with other scientists. Managers generally communicate well with other managers. Within each group, there is a common language, a shared way of viewing the world. In addition, some scientists have found effective

---

Risk Communication: A Handbook for Communicating Environmental, Safety, and Health Risks, Sixth Edition. Regina E. Lundgren and Andrea H. McMakin.

© 2018 The Institute of Electrical and Electronics Engineers, Inc., and Regina E. Lundgren and Andrea H. McMakin. Published 2018 by John Wiley & Sons, Inc.

ways of communicating with managers and vice versa. However, once we step very far outside this shared vision, effective communication becomes much more difficult.

Suppose you are vacationing in a country where English is seldom spoken and you know little of the local language. You notice that the elevator door in your hotel is stuck open on the fifth floor. Being a good risk communicator, you try to alert the first hotel employee that you see to the potential danger. To your chagrin, you find that the helpful chambermaid does not speak a word of English.

Obviously, your usual mode of communication will not work. You cannot explain to her that the risk of people falling to their deaths is approximately 3E-6. You cannot hand her Poole's latest paper discussing all the possible ways in which open elevator doors can cause increased morbidity and reduced life spans. You cannot hold an open public forum and take depositions and written comments for a 45-day period.

You have to try something different. You could draw a picture, you could take her out and show her the door, or you could wander in search of someone to translate. Doubtless, there are also other ways that you could convey your message. The most effective ways, of course, will be those that address her needs. For example, if she has been told *not* to fraternize with guests and to do her work more quickly, she will probably avoid or ignore you as much as she can to get on with her work, a behavior for which you will have to compensate if you are to succeed in your communication efforts.

Audience analysis (that is, determining the audience's characteristics and needs) is a tool too often neglected in risk communication. In almost every case in which communication efforts failed, inadequate or faulty audience analysis is at least partly to blame. *You must know with whom you are communicating if you are to communicate with any hope of success!*

BEGIN WITH PURPOSE AND OBJECTIVES

You can begin to develop an understanding of your audience by looking at your purpose and objectives. Why are you communicating risk? If you are conducting care communication—risk communication in which the risk is not in doubt—you are generally communicating to increase awareness and change behavior. Whose behavior are you trying to change: a group of workers, a specific group in a community, an entire community, or a specific group across the country? If you are conducting consensus communication—risk communication to reach agreement about the way a risk is assessed or managed—you are generally communicating to encourage consensus building. Who must reach that consensus: a federal agency, its contractors, concerned citizens groups, or industry representatives? If you are conducting crisis communication—risk communication relative to an immediate threat—you are generally communicating to alert the audience and provide ways to minimize the risk. Who is at risk: several communities, one community, or specific people within that community? Answering these questions will give you a basic knowledge about who you are trying to reach.

Be aware, however, that sometimes the audience is broader than you might think. For example, Dr. Jeremy Green at Brigham and Women's Hospital and Harvard Medical School found that family members and friends were equally important members of the audience when trying to communicate with patients with diabetes through social media (Green et al. 2010). When it comes to consensus communication, the U.S. Nuclear Regulatory Commission's Guidelines for External Risk Communication recognizes several types of audiences, including stakeholders impacted because they belong to an organization (for example, licensees), people impacted because their personal lives will be affected (perhaps by citing of a new facility), the generally concerned public, and the news media (Persensky et al. 2004).

> Crisis responses have to be considered in terms of the needs of local communities and citizens immediately affected by the crisis, but also of the diverse needs of those who feel connected to or part of the crisis events even though they may live thousands of miles away.
> —Blankson et al. (2012, p. 220)

CHOOSE A LEVEL OF ANALYSIS

After examining your purpose and objectives, you have limited knowledge of your audience. How much you more fully analyze your audience will depend on several factors within and without your organization. Factors within your organization include funding, schedule, availability of staff and information sources, and approvals required. The first three factors are fairly self-explanatory. The more funding available, the more you may be able to use for audience analysis, and the more detailed your analysis can be. The more time available, the more detailed your analysis can be. More staff and resources will also help you achieve a more detailed analysis. However, the fourth factor, approvals required, merits additional discussion.

Approvals for some of the audience analysis techniques discussed in this chapter can be difficult to obtain. If you are a federal agency or government contractor, for example, any survey with more than 10 participants will require approval by the U.S. Office of Management and Budget. This approval can take some time. In addition, because of liability and privacy issues, many organizations also have approval requirements for "human subjects research," which may include any form of questioning.

> How much you fully analyze your audience will depend on several factors. Factors within your organization include funding, schedule, availability of staff and information sources, and approvals required.

Legal offices and public affairs departments may also have to approve any discussions with people outside the organization. Before you start any audience analysis, find out which approvals will be necessary, how long will they take, and who makes the final decision. Also find out if anyone else has been through this maze and whether you can follow their path. Then draw yourself a map of that path with all its turnings so that you can not only make it through the maze but also plan for future efforts.

Before you start any audience analysis, find out which approvals will be necessary, how long they will take, and who makes the final decision.

Factors outside your organization to consider when choosing an appropriate level of audience analysis are those that derive from your purpose and objectives and from the audience itself. What you have to communicate and what you hope to accomplish affect the amount of information you need about your audience. More information is always better than less; however, if your purpose is merely to raise awareness, you may need less information than if your purpose is to change behavior patterns. To raise awareness, you may need to know only reading or education levels and preferred ways of communicating. To change behavior, you need a more complete psychological profile, including why the members of your audience are practicing the behavior to begin with, their feelings about the risk, and what would motivate them to change.

Lessons learned from devastating wildfires in Australia show that failure to reach the audience contributed to failure to protect the community.
—Galloway and Kwansah-Aidoo (2012)

Not surprisingly, your audience also influences your choice of levels of audience analysis. Are the members of the audience spread over wide areas? If so, do you have the time and funding to reach each area? Do they differ greatly in other ways (for example, are some highly educated while others failed to finish high school)? Do you have the time and funding to fully analyze each segment or will you have to do one in depth or both more shallowly? Is the audience already so hostile to your organization or efforts that they might refuse to be interviewed? In that case, you will have to use less-direct methods to gather information. Do you already know that they have reading difficulties that require you to use methods that would not require them to read surveys or write? Some of these questions are a little like the question of whether the chicken or the egg came first—you need to know the information before you can properly analyze their needs, but you can only get the information after doing some sort of analysis.

Audience analysis efforts can generally be divided into three levels:

1. **Baseline audience analysis.** This includes information largely related to the audience's ability to comprehend the communication, such as reading

ability, preferred methods of communication, and level of hostility. At least a baseline audience analysis should be conducted for any risk communication effort. However, for crisis communication, it may be the only level needed.

2. **Midline audience analysis.** This includes baseline information plus information about socioeconomic status and occupation, demographics such as age and gender, and cultural information. A midline audience analysis will usually suffice for care communication in which the purpose is to increase awareness.
3. **Comprehensive audience analysis.** This includes baseline and midline information plus psychological factors, such as motivations and mental models of risk. A comprehensive audience analysis is usually necessary in consensus communication and care communication in which the purpose is to change behavior.

The cost and time associated with any of these levels depend largely on how the information is gathered, but both generally increase with each level of effort. A baseline audience analysis will usually take one person working full time between 4 hours and 2 weeks, a midline 1 week to 1 month, and a comprehensive 3 weeks to 2 months.

The U.S. Environmental Protection Agency (EPA) has issued an excellent resource for audience analysis: *Community Culture and the Environment: A Guide to Understanding a Sense of Place* (EPA 2002). It is designed to provide "a process and set of tools for defining and understanding the human dimension of an environmental issue" (p. 3). Although it is focused on helping the EPA foster community-based environmental protection, the guide's process could be applied to any health intervention at a community level. The approach is flexible, but if it is used to its full extent, the resulting analysis would be beyond comprehensive. Some of the characteristics suggested for analysis include the following:

- **Community boundaries.** Natural, physical, administrative, social, and economic characteristics that distinguish one community from another
- **Community capacity and activism.** How local leaders and citizens influence localdecisions
- **Communication interaction and information flow.** How people interact and exchange information
- **Demographic information.** Population description
- **Economic conditions and employment.** History, present, and future of the local economy
- **Education.** The level of schooling achieved and the role of education in the community
- **Environmental (or health) awareness and values.** Knowledge, concerns, and perceptions and how these influence daily life

- **Governance.** How decisions are made from the local to federal levels
- **Infrastructure and public services.** Roads, schools, police, fire, and so on
- **Local identity.** Quality-of-life issues, history, art, and local traditions
- **Local leisure and recreation.** How community members spend their free time
- **Natural resources and landscapes.** Natural features of the area
- **Property ownership, management, and planning.** Who owns land and who is responsible for land-use planning
- **Public safety and health.** Personal safety and health issues
- **Religious and spiritual practices.** Importance, variety, and beliefs associated with local religions and spiritual practices

In addition, consider where your audience stands on the perception of the risk you are communicating. Studies in Norwich, the United Kingdom, showed that audience's perceptions move through three distinct phases:

1. Development, in which people first discover the risk and begin making associations based on social and cultural structures as well as personal considerations
2. Maintenance, in which people selectively take in new information, with a bias toward enforcing previously held perceptions
3. Transition, in which a new event changes perceptions (usually rapidly) (Bennett and Calman 1999)

Many of these characteristics are also noted in Tables 8.1–8.3 for the baseline, midline, and comprehensive audience analysis, respectively.

DETERMINE KEY AUDIENCE CHARACTERISTICS

Once you have determined the appropriate level of analysis (considering organizational and audience factors), make a detailed list of the characteristics you need to know. Refer to Tables 8.1–8.3 for suggestions. Depending on your specific situation, you may want to add characteristics to these lists or delete some. For example, if you will not be developing written materials, then reading level is not a characteristic you will need to determine.

Remember too that your audience is likely made up of many different cultures that must be taken into account for risk communication to be successful. Researchers Robert Littlefield of North Dakota State University and Timothy Sellnow at the University of Central Florida stress the difference between being culturally sensitive (using different languages, methods, and spokespeople) and being culturally centered. In the first approach, the organization charged with

Table 8.1. Key Audience Characteristics for the Baseline Audience Analysis

Characteristics	Questions to ask yourself	How answers affect risk communication
Experience with the risk	Is risk new to the audience or something they have been living with for a long time?	If new, build awareness first. If familiar, build on known concepts.
Experience with organization communicating risk	Are they familiar with the organization? Do they find it credible?	If unfamiliar, explain organization's role. If familiar and credible, build on goodwill. If familiar but not credible, use an outside spokesperson.
Background in risk subject matter	How much do they understand about the risk scientifically?	If little, provide an explanation. If a great deal, build on concepts.
Reading level	At what level do they read?	If lower level, simplify language, organization, and sentence and paragraph structure. At higher level, can use more complex language.
People they trust and believe	Whom do they trust and believe?	Choose that person as the spokesperson.
Information sources	Where do they get information (television news, newspapers, radio, Internet, social media, family networks, personal experience)?	Use that source to disseminate risk messages.
Education level	What is the highest level of education completed? What is the range?	If higher levels, use more complex concepts. If lower levels, provide basic information.
Group size	How many people are in the audience?	If larger audience, use a method like the Internet. If smaller audience, use a more intimate method like meetings.
Goals/expectations for risk communication process	What do they expect to happen when you communicate risk?	Whenever possible, match or exceed their goals and expectations.
Their role in the risk communication process	Based on laws and organization's requirements, what can the audience's role be?	Whenever possible, involve them in the way they want to be involved.
Their "hot buttons"	Are there words and concepts that infuriate them?	Avoid those words. Find other ways to discuss concepts.

Table 8.2. Key Audience Characteristics for the Midline Audience Analysis

Characteristics	Questions to ask yourself	How answers affect risk communication
Age	What age range do they fall into? What 5-year range has the most people in it?	Consider possible concerns: families, careers, retirement.
Culture	How many different cultures make up the audience? How does each view the world?	Respect and address different views.
Gender	Are they mostly male or female?	Consider how gender affects risk probability.
Turnover within the community (yearly)	Is this a transient community or one with deep local ties?	If transient, use self-contained messages. If more stable, build on previous messages.
Preferred social institutions	Where do they go to relax? To play? To worship?	Determine possible concerns. Use preferred locations to hold meetings.
Length/history of involvement	How long have they been involved with the risk? Has the involvement been one of passive listening, consensus building, or reactive argument?	If passive, build on concepts and encourage activity. If consensus building, provide information and encourage involvement. If reactive, acknowledge concerns to lower hostility and encourage activity.
Jobs/ occupations	Where do they work? What do they do there? Is the risk part of their workplace?	If jobs relate to risk, focus on how to mitigate. If not, determine possible concerns.
Geographic areas	How near is the risk?	If close to risk, provide information to mitigate. In general, determine possible concerns. If large geographic area, use method like the Internet. If smaller area, use more intimate method like meetings.

communicating the risk decides how to address the culture. In the second approach, the organization works with the audience to decide (Littlefield and Sellnow 2015). For more information on involving your audience more fully in the risk communication process, see Chapter 17.

Each level of analysis builds on the last; that is, the midline includes everything in the baseline, and the comprehensive includes everything in the baseline and midline.

Table 8.3. Key Audience Characteristics for the Comprehensive Audience Analysis

Characteristics	Questions to ask yourself	How answers affect risk communication
Concerns and feelings about risk	What kinds of concerns do they have? How do they feel about the risk (angry, frustrated, apathetic)?	Address concerns and feelings in risk messages.
Experience with other risks	Have they had good examples you can build on? Bad examples to overcome?	If good, build on them. If bad, acknowledge them and begin with basic risk information.
Exposure to news media or other coverage	Have they seen comprehensive coverage or tabloid-style journalism?	If comprehensive, build on it. If tabloid, acknowledge it and begin with basic risk information.
Effect of the risk on them	How do the experts think the risk can affect them? How does the audience think it can affect them?	If two views differ, address misconceptions to correct. If two views are identical, build on concepts.
Their control over the risk	Can they mitigate the risk or must they live with it?	If mitigatable, give ways. If no control, try to empower with knowledge.
Goals of organized groups	What are they trying to accomplish?	Determine possible concerns and feelings.

DETERMINE HOW TO FIND AUDIENCE ANALYSIS INFORMATION

There are many ways to gather the audience analysis information listed previously. The best way is to go out and talk to your audience, actually meet them face to face. This can be done by conducting interviews, conducting surveys (face to face or less directly through the mail), sponsoring members of the audience as advisors, hosting focus groups, or pretesting prototype risk messages with audience members. These direct methods often provide the most current, risk and situation-specific information. Unfortunately, these methods are infrequently used in risk communication efforts for several reasons:

> There are many ways to gather audience analysis information. The best way is to go out and talk to your audience, actually meet them face to face.

- The members of the audience are so dispersed or in such large numbers that it is impossible to meet them all or even representatives.
- The costs and time involved are prohibitive in a given situation.

- The audience is hostile and refuses to associate with anyone connected with the risk or its assessment, management, or communication.
- The very idea of actually meeting with the audience terrifies some members of the organization conducting the risk communication effort.

Surrogate audiences are people to whom you have easy access who seem to approximate the general audience you are trying to reach.

If these reasons apply in your situation, you may have to choose other methods of gathering audience information. Less-direct methods of gathering audience information include using surrogate audiences and consulting other sources of information. Surrogate audiences are people to whom you have easy access who seem to approximate the general audience you are trying to reach. If, for example, you are trying to construct a risk message for a distant community, but have no time to fly there and conduct a more direct analysis, you might find a local community that seems similar and interview or survey the people there. The danger in using this method is that you are forced to make assumptions based on very little information. These assumptions may prove wrong and cause your risk communication efforts to be less than successful. However, some audience information is generally better than none.

Another way to use surrogate audiences is to look to the risk communication literature to find examples of audiences that have been studied in detail and seem to match your audience (based on your purpose and objectives). Callaghan (1989), for example, divided audiences into the scientific/medical community, government agencies, a specific community, and the public (which would include a number of communities). He determined characteristics for each of these audiences and used that information to tailor risk messages. His advice for each was

- To present risk effectively to *the scientific/medical community*, work through professional societies and conferences, personal communication, and impartial databases. Use simple English (as opposed to the scholarly writing often seen in professional journals), with references for additional information. Target mailings to society members and develop special interest groups within societies. Begin a newsletter on your risk that includes both scientific information and clearly labeled opinions, and develop traveling seminars that could be given to society groups.
- To present risk effectively to *government agencies*, provide in-depth information at the beginning. Use information packages that consist of a position statement in nonspecialist language, backed up by research information. Have a scientist or other expert in the field present the information to the group. Identify the decision makers and those who will offer advice and concentrate on key individuals who will be able to influence others.

- *For communities*, use more personal communication. Use open meetings with a skillful moderator. Follow up with stories in union and company publications, and with video or classroom instructional materials.
- *For the public* in which there is little or no hostility, use the news media (press conferences, news releases, interviews, video and audio tapes, and media hotlines; see Chapter 16 for more information). If there is hostility, send credible experts to radio and television talk shows, radio call-in shows, and major public forums. Also, submit articles to the newspapers for the opinion-editorial page and stories to magazines, which can be reprinted and sent to specific segments of the audience.

Another indirect method of gathering audience analysis information is to use other sources of information:

- **Staff sociologists.** Many large organizations have on staff a group of social scientists who compile information about the local community and other people with whom the organization comes into contact regularly. They can provide a wealth of information for audience analysis. If your organization does not have such a staff, and you have time and money, you can hire social scientists (from colleges and universities or independent consulting firms) to develop surveys, interview key audience members, and compile information to meet your needs. Sometimes graduate or undergraduate classes will do the research for you for the experience and/or a nominal fee as a class project.
- **Environmental impact statements.** Many environmental impact statements incorporate information about the local communities and economy. Although they will not give you sufficient information for a comprehensive audience analysis, they can provide information for the baseline and midline analyses. Sources include local libraries and government document repositories. Many documents are now available online as well.
- **Documentation of work for the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or Superfund)**. By law, a Superfund site must have a community relations plan. This plan should include information about the community (and, thus, the audience with whom the environmental cleanup contractor must communicate). Sources include local libraries, government document repositories, the U.S. EPA, and the Internet.
- **The Internet.** Nearly every community and group has a website that can provide a wealth of information, often in the language and style preferred in the area. If your audience regularly visits your organization's website, you may be able to glean some baseline information from the statistics.
- **Social media.** Many organizations and communities have their own sites and groups as well. If you are charged with communicating risks over the long term to a specific community, consider joining the conversation.

- **Census data.** These data cover demographics, economic trends, and education levels. Sources include local libraries, government repositories, and the Internet.
- **Local television station and radio station advertising profiles.** Stations need to know to whom they are broadcasting to attract advertising and viewers or listeners. They may be willing to share this information with you if you explain why you need it. They may charge a fee.
- **Local newspapers and magazines advertising profiles.** These media also need to know their readership to attract advertising and increase subscriptions. They may be willing to share this information with you if you explain why you need it. They may also charge a fee.
- **State or local political groups.** Again, these organizations need to know their constituencies to encourage voting and share opinions. They may be willing to share this information with you if you explain why you need it.
- **Health care agencies and cancer centers.** Public affairs or communications groups within larger health care agencies often have to communicate to a large group and will have developed community profiles. They may share these if you explain why you need the information.
- **Chambers of Commerce or other community economic development organizations.** These organizations also conduct community research to provide information that might attract new businesses to the area. They may be willing to share if the purpose of your risk communication effort will assist the community.
- **Market analysis information.** Firms such as Gallup, Harris, and Opinion Research conduct surveys and interviews to gather information for marketing purposes. They may be willing to share existing information for a fee and can develop specific surveys and interviews to meet your needs. These tailored services can be more expensive than using your own staff, but may be cost- and time-effective for large risk communication efforts.
- **Related information materials.** In consensus communication and sometimes in care communication, other organizations besides yours will also be communicating about the risk. These organizations may in fact be part of the audience. Look at how they frame questions, what factors seem important to them, and the language they use. This information can give you important clues to answer your audience analysis questions.
- **Job descriptions.** For communication focused on specific types of workers, job descriptions can indicate education levels preferred, years of experience, and other factors useful in analyzing that audience.

Which sources you use to gather information concerning your audience depends not only on your situation (time, funding, and organizational support) but also on whether you are conducting care, consensus, or crisis communication. For care communication, useful sources differ depending on whether you are

Table 8.4. Less-Direct Sources Most Useful for Audience Analysis for Various Types of Risk Communication

Type of risk communication	Most useful source
Care communication	
Health care (heterogeneous audience)	Market analysis information Health care agencies
Health care (homogeneous audience)	Surrogate audience Advertising profiles Internet Census data
Industrial risk	
Industrial hygiene	Job descriptions
Worker notification	Surrogate audience
Consensus communication	None—direct contact required for this type of communication to succeed
Crisis communication[a]	Staff sociologists Environmental impact statements CERCLA documentation Political groups

[a] Crisis communication sources also depend on the timing of the analysis. Sources listed are most useful before the crisis, during emergency planning. During a crisis, use whatever sources are immediately available, including surrogate audiences.

conducting health care communication (in which human health in general is at risk) or industrial risk communication (in which worker health or safety is at risk). Industrial risk communication can be divided into industrial hygiene and individual worker notification. The less-direct sources of audience analysis information most useful for each of these types of risk communication are shown in Table 8.4.

A possible issue with using these indirect methods is the validity of the information. The less direct, that is, the farther from the source (your audience itself), the more likely that the information is actually an interpretation or at least partly assumed. To compensate for this problem, use multiple sources of information to confirm audience characteristics and needs.

> Which sources you use to gather information concerning your audience depends not only on your situation but also on whether you are conducting care, consensus, or crisis communication.

INCORPORATE AUDIENCE ANALYSIS INFORMATION INTO RISK COMMUNICATION EFFORTS

Once you gather all this information, what do you do with it? Audience analysis information is used to tailor risk messages to meet specific audience and situational needs. The information can tell you what media to use, how much audience interaction is needed, and what concerns must be addressed, among other factors (Table 8.5).

Audience analysis information is also often used to determine the proper "style" for written messages. Many organizations use computer software such as "style checkers," or apply readability formulas. Although these tools will give you

Table 8.5. Using Audience Analysis Information to Tailor Risk Messages

Information learned	How to tailor the message
Audience unaware	Use graphic method—high color, compelling visuals, and theme.
Audience apathetic (or feels like victims)	Open risk assessment and management process to stakeholder participation. Show where past interactions have made a difference. Provide choices.
Audience well informed	Build on past information.
Audience hostile	Acknowledge concerns and feelings. Identify common ground. Open risk assessment and management process to stakeholder participation.
Audience highly educated	Use more sophisticated language and structure.
Audience not highly educated	Use less sophisticated language and structure. Make structure highly visible, not subtle.
Who the audience trusts	Use that person to present risk information.
Where the audience feels comfortable	Hold meetings in that location.
The method by which the audience gets most of its information	Use that method to convey your message.
Who makes up the audience	Ensure that the message reaches each member.
How the audience wants to be involved in risk assessment or management	If at all possible, given time, funding, and organizational constraints, involve the audience in the way they want to be involved.
Misconceptions of risk or process	Acknowledge misconceptions. Provide facts to fill gaps in knowledge and correct false impressions.
Audience concerns	Acknowledge concerns and provide relevant facts.
Highly segmented audience, with many cultures	Enlist representatives to pretest messages. Translate concepts into other languages and use culturally appropriate examples, colors, and points of contact. Find spokespeople who are part of the community.

written messages that conform to a particular grade or reading level, they may also give you messages that are flat, boring, and monotonic.

Studies have shown that the concept loading, or number of concepts, and the placement of those concepts in the sentence, is far more important to readability and comprehension than the length of words or their number in a sentence. Take, for example, the following sentence:

Because of differences in lifestyles, certain members of this group, particularly infants and the elderly, are more likely to be affected.

This sentence would be rated at about the 10th-grade reading level according to the Fog Index, a readability formula developed by Robert Gunning and Douglas Mueller. After all, it contains 21 words, several with three or more syllables. However, according to the theories of concept loading and placement, this sentence should be readable at a much lower level. There are three main concepts, with one clarifier, each contained in its own phrase or component of the sentence. With any skill, the communicator can stack such phrases so that each sentence and paragraph builds on the next. An outstanding user's guide developed for the U.S. Food and Drug Administration provides additional advice on using readability formulas and other tools to meet audience needs (Fischhoff et al. 2011).

CHECKLIST FOR ANALYZING YOUR AUDIENCE

Based on the purpose and objectives, general audience, and organizational constraints, the most appropriate level of audience analysis is

- ☐ baseline
- ☐ midline
- ☐ comprehensive

The list of key characteristics to be analyzed was based on the

- ☐ purpose and objectives
- ☐ general audience
- ☐ level of analysis based on
  - ☐ time
  - ☐ funding
  - ☐ availability of staff
  - ☐ approvals required

Audience analysis information will be gathered by the following:

- ☐ Direct methods
  - ☐ Interviews

  - ☐ Surveys
  - ☐ Focus groups
- ☐ Less-direct methods
  - ☐ Surrogate audiences
  - ☐ Existing sources of information
- ☐ For direct methods:
  - ☐ necessary approvals have been determined
  - ☐ necessary approvals have been received
- ☐ For less-direct methods:
  - ☐ multiple sources were used to confirm audience information
- ☐ Audience analysis information was used to
  - ☐ tailor risk communication strategies
  - ☐ determine appropriate
    - ☐ language
    - ☐ sentence structure
    - ☐ organization

REFERENCES

Bennett, P. and K. Calman. 1999. *Risk Communication and Public Health*. Oxford University Press, New York.

Blankson, I. A., S. Natasia, and M. Liu. 2012. "A Triple Disaster in One Fell Swoop: Rethinking Crisis Communication in Japan after March 11." In A. M. George and C. B. Pratt, eds., *Case Studies in Crisis Communication: International Perspectives and Hits and Misses*. Routledge, New York, pp. 196–226.

Callaghan, J. D. 1989. "Reaching Target Audiences with Risk Information." In V. T. Covello, D. B. McCallum, and M. T. Pavlova, eds., *Effective Risk Communication: The Role and Responsibility of Government and Nongovernment Organizations*. Plenum Press, New York, pp. 137–142.

EPA (U.S. Environmental Protection Agency). 2002. *Community Culture and the Environment: A Guide to Understanding a Sense of Place*, EPA 842-B-01-003. Office of Water, Washington, DC.

Fischhoff, B., N. T. Brewer, and J. S. Downs, eds. 2011. *Communicating Risks and Benefits: An Evidence-Based User's Guide*. U.S. Food and Drug Administration, Washington, DC.

Galloway, C. and K. Kwansah-Aidoo. 2012. "Victoria Burning: Confronting the 2009 Catastrophic Bushfires in Australia." In A. M. George and C. B. Pratt, eds., *Case Studies in Crisis Communication: International Perspectives and Hits and Misses*. Routledge, New York, pp. 279–292.

Green, J. A., N. K. Choudry, E. Kilabuk, and W. H. Sharnk. 2010. "Online Social Networking by Patients with Diabetes: A Qualitative Evaluation of Communication with Facebook." *Journal of General Internal Medicine*, 26 (3): 287–292.

Littlefield, R. S., and T. L. Sellnow, eds. 2015. *Risk and Crisis Communication: Navigating the Tensions Between Organizations and the Public*. Lexington Books, Lanham, Maryland.

Persensky, J., S. Browde, A. Szabo, L. Peterson, E. Specht, and E. Wright. 2004. *Effective Risk Communication: The Nuclear Regulatory Commission's Guidelines for External Risk Communication*, NUREG/BR-0308. U.S. Nuclear Regulatory Commission, Washington, DC.

ADDITIONAL RESOURCES

Arkin, E. B. 1989. "Translation of Risk Information for the Public: Message Development." In V. T. Covello, D. B. McCallum, and M. T. Pavlova, eds., *Effective Risk Communication: The Role and Responsibility of Government and Nongovernment Organizations*. Plenum Press, New York, pp. 127–135.

Babbie, E. 1973. *Survey Research Methods*. Wadsworth Publishing Company, Belmont, California.

Barke, R. P. n.d. *"Surveys on How Specific Audiences See Risk."* School of Public Policy, Georgia Institute of Technology, Atlanta, Georgia.

Butler, L. M. 1995. *The "Sondeo" A Rapid Reconnaissance Approach for Situational Assessment*. Community Ventures, a Western Regional Extension Publication, WREP0127. Washington State University, Pullman, Washington.

Hodges, M. 1992. "How Scientists See Risk." *Research Horizons*. Georgia Institute of Technology, Atlanta, Georgia, pp. 22–24.

International Association for Public Participation. https://www.iap2.org/ (accessed October 15, 2017).

Kar, S. B., R. Alcalay, and S. Alex, eds. 2001. *Health Communication: A Multicultural Perspective*. SAGE Publications, Thousand Oaks, California.

McDonough, M. H. 1984. "Audience Analysis Techniques." *Supplements to a Guide to Cultural and Environmental Interpretation*. U.S. Army Corps of Engineers, Waterways Experiment Station, Vicksburg, Mississippi.

Pearsall, T. E. 1969. *Audience Analysis for Technical Writing*. Glencoe Press, Beverly Hills, California.

Santos, S. L. 1990. "Developing a Risk Communication Strategy." *Management and Operations*, November: 45–49.

Warren, T. L. 1993. "Three Approaches to Reader Analysis." *Technical Communication*, 40 (1): 81–88.

Weinstein, N. D. and P. M. Sandman. 1993. "Some Criteria for Evaluating Risk Messages." *Risk Analysis*, 13 (1): 103–114.

9

DEVELOP YOUR MESSAGE

When conveying risk-related information, it often helps to develop key messages as part of the planning process. Messages help focus all communication participants on the most important information and how to convey it. In care communication, messages usually convey the essential nature of a risk and what people can do to avoid or reduce it. In consensus communication, a stakeholder group may want to develop its own messages when recommending policy or actions to be taken by decision makers. In crisis communication, making all organizational participants aware of the key messages (even if they evolve during the crisis) can make recovery actions more effective, reduce confusion, and increase organizational credibility. In a crisis, key messages are especially important for media spokespeople and those who staff phone hotlines.

Message development in risk communication is not the same as developing a catchy slogan in an advertising campaign. Message development is not manipulative, nor is it a substitute for audience analysis or public participation. The point is not to try to bombard people with what you think they ought to know but to understand what they want and need to know to address those things in a clear, concise way. As public health researchers in the United Kingdom found, the idea

---

Risk Communication: A Handbook for Communicating Environmental, Safety, and Health Risks,
Sixth Edition. Regina E. Lundgren and Andrea H. McMakin.
© 2018 The Institute of Electrical and Electronics Engineers, Inc., and Regina E. Lundgren
and Andrea H. McMakin. Published 2018 by John Wiley & Sons, Inc.

is to state the risk information in a way that supports continued sharing on all sides (Bennett and Calman 1999).

The following sections discuss some common pitfalls in developing messages, what people want to know about risks, and how to craft messages for various risk situations.

Message development is not manipulative, nor is it a substitute for audience analysis or public participation.

COMMON PITFALLS

Message development is not as easy as it sometimes appears. Everything from the words that are used to the order they are used to the way they are expressed can hinder sharing information between the risk communicator and the intended audience and from the audience to the communicating organization. One of the most common pitfalls is framing.

Framing deals with how risk information is presented. Studies have shown that how information is framed can affect people's reaction to it or the conclusions they draw from it. For example, two groups were shown the same risk information on a new cancer treatment. In the first group, the information was framed as to how the treatment affected the chance of dying. In the second group, the information was framed as to how it affected the chance of survival. Choices to accept the treatment more than doubled in the second group, even when the participants were physicians who might have been expected to understand the difference in the framing (Bennett and Calman 1999).

Another pitfall is the concept of "no risk." When exhaustive studies have shown that a particular public concern is unlikely to pose a risk, it is tempting to craft messages that claim there is nothing to fear. However, no risk assessment is without uncertainty, and no situation is ever completely without risk. After seeing the billions of dollars lost and thousands of cattle killed following the mad cow disease outbreak and subsequent risk communication failure in the United Kingdom, risk communication experts William Leiss and Douglas Powell advocated banishing "no risk" messages (Leiss and Powell 2004).

Another challenge in crafting messages is how to share numerical information. As noted earlier in the book (see Chapter 4), people generally have a limited ability to process numerical data. The National Adult Literacy Survey says that nearly half of all people have some trouble understanding simple math. Ellen Peters of the noted research firm Decision Research recommends the following to help convey numerical messages:

- Highlight the most important information.
- Pretest symbols and graphics.
- Align data with general thinking (for example, in a choice of one to five, the highest number would be best).

- If you state probabilities as 1 chance in X, keep X consistent.
- Give visual clues as to the importance of information (for example, use larger fonts or bold items).
- Consider expressing risks as absolute risks (1 in 10) as opposed to relative risk (10%) and do not use decimals (Tucker et al. 2008).

See Chapter 14 for more guidance on conveying numerical information visually.

The idea of benefits associated with a risk can also prove a stumbling block for risk communicators. Benefits are the so-called good that can come from taking a particular risk. A nuclear power plant, for example, might bring new jobs, an increased tax base, and additional electricity to an area, as well as the potential risks from industrial and environmental accidents and the long-term problem of nuclear waste. Some industries advocate cost–benefit analysis, where the environmental, safety, and health risks are allocated some dollar value and compared with the dollar value of the benefits.

But benefits can be a tricky component of risk communication messages if not used with care. When explaining potential health care risks in care communication, for example, a patient would expect a doctor to provide the benefits as well as the risks so that the patient can make an informed decision. In consensus communication, all those working together to determine the most appropriate outcome should weigh both the risks and the benefits. In crisis and emergency communication, however, a discussion of benefits would seem out of place. As the flood waters rise, who wants to hear that plummeting property values will allow more first-time homeowners into the market? In many cases, the benefits of implementing the risk advice also seem obvious (evacuate or risk drowning, shelter in place to avoid exposure).

An example of the potential dangers in including benefit information along with risk information is the U.S. Food and Drug Administration's (FDA) announcement in 2007 of a Risk Communication Advisory Committee. The FDA created this committee on the Institute of Medicine's recommendation to address how the agency communicates information about the efficacy, safety, and use of drugs and other regulated medical products. The FDA decided to broaden the committee's scope to include all products and benefits along with the risks. Coming so soon as it did after the deaths of many pets from tainted food, the idea that the committee would consider benefits ignited an online firestorm of criticism among stakeholders that took months to calm.

To determine whether to include benefits in risk communication information, consider the following:

- Would the person at risk expect to hear about the risk's benefits from your organization? When a regulatory agency discusses the benefits of a risk, the audience often reacts with hostility, assuming that the agency has forgotten its charter to protect the public.

- Would including benefits further the risk communication dialogue? For example, a stakeholder group evaluating a new product might need benefit information.
- Would having benefit information allow the person at risk to make a more informed decision? For example, knowing the benefits of an operation as well as the risks allows for better patient decision making.

If you cannot answer yes to at least one of these three questions, think twice before mixing risk and benefit information. Remember the cardinal rule of risk communication: Know your audience!

As if these challenges weren't enough, research suggests that even the most carefully crafted risk messages may have unintended consequences. University professors Charles T. Salmon (Nanyang Technological University, Singapore), Sahara Byrne (Cornell), and Laleah Fernandez (Michigan State) identified many reasons audiences may respond contrary to a risk message, including protecting their freedom, experimenting because of increased awareness, normalizing risky behavior through message repetition, pushing audiences from concern to panic, lack of trust in the source, discounting, and stigmatizing those at risk. The researchers strongly encourage involving the audience in message development and pretesting messages (Salmon et al. 2014).

Professor P. Sol Hart at the University of Michigan had another word for the phenomena of unintended consequences: boomerang. In such situations, audiences either process the message as intended but choose to take the opposite behavior to the one recommended or fail to process the message and take riskier action. He advocates clearly articulating efficacy for action; aligning all messages elements, visual, verbal, text, and body language; and accounting for audience predispositions in audience analysis (Hart 2014). For more information on audience analysis, see Chapter 8.

Many technologies and services are available to help communicators better understand peoples' responses to new, conflicting, or uncertain messages. The software platform Vizzata™, for example, is an online tool that shows people's reactions to bite-sized pieces of content, whether text, audio, images, or video. Respondents are selected from pools of people representing the target stakeholders or audiences. Risk communicators can have an online dialogue with their respondents as they react to the content. Tools like this help communicators understand public reactions to topical issues, test and refine messages, and measure engagement with their content.

The European organization FoodRisC used the Vizzata platform in 2013 when the Food Safety Authority of Ireland announced that horse and pig DNA was found in beef products. Research results from Vizzata showed there was very little evidence of consumer concerns about health risks at that early stage of the incident. Consumers were principally worried that ingredients on labels did not match the contents of the products (NewsMedical.net 2013). This information gave communicators more insight to create relevant messages as well as monitor any changes in perceptions as time went on.

Case Study: One Message Leads to Panic

Early on a Saturday morning in January 2018, the Hawaii Department of Emergency Management utilized the emergency alert system to issue a single message to more than a million people via cell phone, radio, and television. "Ballistic missile threat inbound to Hawaii. Seek immediate shelter. This is not a drill." The message described the threat, directed an action that should be taken, and ended with its own version of proof as to its validity. At a time of heightened concerns about a possible missile strike from North Korea, the message was all too easy to believe.

The result? Widespread panic. Some locals sheltered in place, hunkering in bathtubs with mattresses covering them and their families. Others leaped on boats and frantically sailed anywhere in hopes of getting beyond the blast range. Tourists sent text messages home wishing loved ones goodbye. Others mobbed hotel desks begging to know the location of the bomb shelter. Though the news that the alert was a false alarm was posted on social media within 20 minutes, it wasn't until more than 30 minutes later that a correction was sent through the emergency broadcast system. The blame was placed on an employee who did not realize the message came from an internal exercise.

After international outcry at the false alarm, the Department of Emergency Management changed its procedures to prevent a similar incident. Authorization to send such a message now requires two people rather than one, and a new process makes a correction equally easy to send quickly. The department also updated its website to provide additional guidance as to how to respond to a potential ballistic missile attack and to answer questions about the risk.

Messages are important. They can raise awareness, offer instruction, and equip and challenge those at risk to take action. But messages alone are not enough. They must be built on a foundation of policy and procedures and be surrounded by supporting information and infrastructure to effectively communicate risk so that people can take protective action in a timely manner. A solid emergency risk communication plan includes ways to issue corrections quickly, and emergency drills should include ways to communicate risk in ways that do not suggest an actual emergency is happening. For more on emergency risk communication, see Chapter 22.

INFORMATION PEOPLE WANT

> [Our research] seems to indicate that people first want to know whether the risk is relevant to them: what it is, what are the consequences, and/or is it likely that one will be exposed to it.
> —Lion et al. (2002, p. 775)

What people want to know about a particular risk seems to vary, depending on several factors including their familiarity with the risk and the expectation for the method being used (for example, static information materials vs. interactive social media). When the audience is faced with an unfamiliar risk, for example, research has pointed to some key pieces of information people are most likely to want to know. Though some people do not seek information out of fear or inability to process the risk, many others want to know everything (Lion et al. 2002). In general, people are interested in the following types of information:

- **Description of the risk.** People want to go beyond technical descriptions to familiar analogies. Thus, risk communicators may want to provide example analogies to aid risk understanding.
- **Risk consequences.** This includes effects and the level of danger associated with the risk.
- **Level of control about the risk and its consequences.** People want to know the answers to questions such as "What should I do?" and "What are agencies doing?"
- **Exposure information.** This includes risk intensity, duration, acceptable risk levels and how they are measured, how long the exposing agent is dangerous, how long it persists, and how it accumulates in the body.

People with higher levels of education also wanted to know how research on the risk was conducted; those with lower education were interested only in the results of the research. The advantages of the risk were uniformly ranked as among the least important information (Lion et al. 2002).

Additional research has focused on how people process risk messages depending on their level of familiarity. A group of university researchers led by LeeAnn Kahlor of the Center for Health Systems Research and Analysis in Wisconsin found that the less people knew about a risk, the more likely that they were to process information in a systematic matter. Such systematic processing was methodical and evaluative. This type of processing tends to lead to attitudes that are more stable and resistant to change, which can help in crisis preparedness and consensus communication efforts. It may also lead to behavior changes, which can help in crisis response and care communication efforts. To encourage systematic processing, risk communicators need to include what audience members *perceive* they need to know, or audiences will not attend to the information (Kahlor et al. 2003).

When it comes to social media, audiences appear to want emotional support as well as specific guidance and feedback on appropriate actions to take. For example, Dr. Jeremy A. Green and his colleagues at Brigham and Women's Hospital and Harvard Medical School found that patients with diabetes divided their messages between information about disease management strategies (approximately two-thirds) and requests for emotional support (approximately one-third; Green et al. 2010).

It is important to note that different cultures may process risk messages differently. Research at the University of Georgia following the devastation from Hurricane Katrina found that Latino communities in the south were more likely to read risk messages if they came from a source trusted by the community, regardless of the language, framing, or other factors in the messages themselves (CDC 2008). Again, know your audience.

MENTAL MODELS

The mental models approach described in Chapter 2 can be used to develop accurate risk messages. Because the time involved can be extensive, this approach is most appropriate for care and consensus communication and for the planning phase of crisis communication.

Messages are developed after conducting interviews that show how people understand and view the risks associated with various phenomena. The approach is not designed to persuade people that risks are small and under control, but rather to supply laypeople with the accurate information they need to make informed, independent judgments about risks to health, safety, and the environment. Morgan et al. (2002) describe a six-step process to learn what people believe and what information they need to make the decisions they face:

1. **Create an expert model of the risk, using an influence diagram.** This is a scientifically accurate model of the processes that determine the nature and magnitude of the risk. Figures 9.1 and 9.2 show two examples, for Lyme disease and HIV/AIDS.

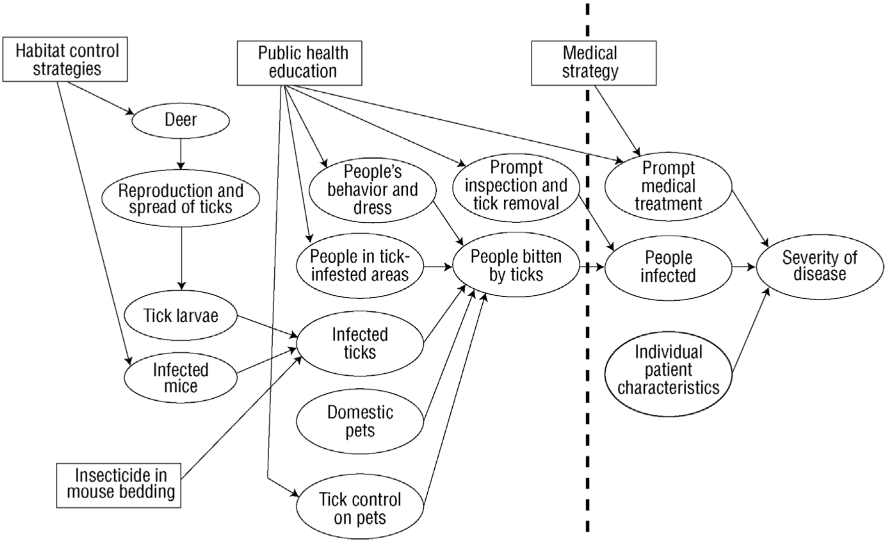

Habitat control strategies
Public health education
Medical strategy
Deer
Reproduction and spread of ticks
People's behavior and dress
Prompt inspection and tick removal
Prompt medical treatment
People in tick-infested areas
People bitten by ticks
People infected
Severity of disease
Tick larvae
Infected ticks
Infected mice
Individual patient characteristics
Domestic pets
Insecticide in mouse bedding
Tick control on pets

Figure 9.1. Simplified expert model of the risk of infection from Lyme disease. The part to the left of the vertical dashed line deals with exposure processes. The part to the right of the vertical dashed line deals with effects processes. (Source: From Morgan et al. (2002) with permission.)

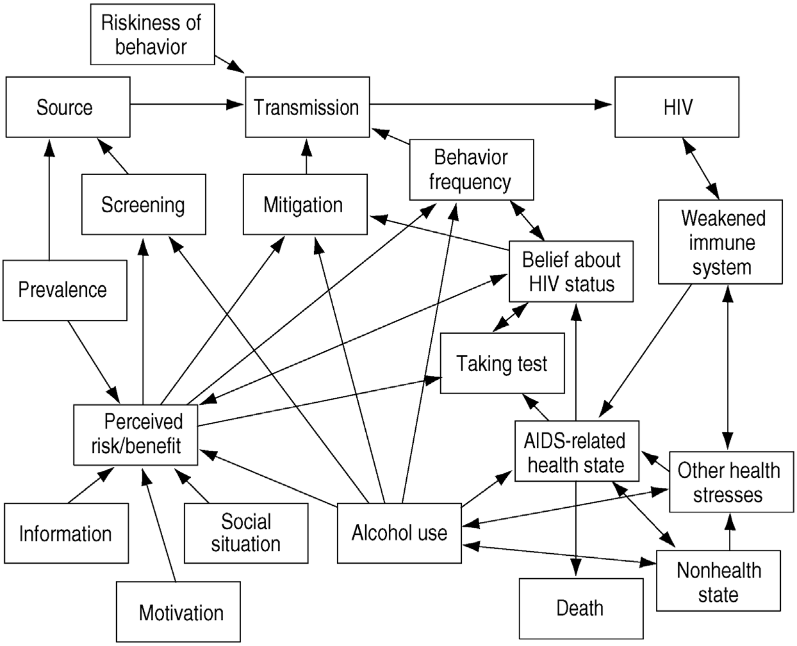

Riskiness of behavior
Source
Transmission
HIV
Behavior frequency
Screening
Mitigation
Weakened immune system
Belief about HIV status
Prevalence
Taking test
Perceived risk/benefit
AIDS-related health state
Other health stresses
Information
Social situation
Alcohol use
Nonhealth state
Motivation
Death

Figure 9.2. Expert model of the risks associated with HIV and AIDS. (Source: From Fischhoff and Downs (1997) with permission.)

2. **Conduct mental models interviews.** Using the expert model, ask questions to learn people's beliefs about the hazard, expressed in their own terms.
3. **Conduct structured interviews.** Interview larger groups of people using a questionnaire that captures the beliefs in the open-ended interviews, to determine the prevalence of the beliefs in a larger population.
4. **Compare the responses with the experts' understanding of the risk.** Note differences.
5. **Draft the risk communication.** Use the results from the interviews, along with an analysis of the decisions people face, to address the most significant incorrect beliefs and knowledge gaps.
6. **Evaluate the communication.** Test and refine the communication with various groups until the communication is understood as intended.

The goal of this process is neither to persuade people that they should make decisions the way scientists do nor to transform people into scientists. It is to make sure that people have the scientifically, technically, and medically accurate information they need to make their own decisions.

Invariably, this process reveals inaccurate (and often unexpected) beliefs that must be addressed in risk communication. For example, interviewers found that some people believe that houses containing radon are permanently contaminated and that radon remediation in homes is impossible or prohibitively expensive. Thus, argue Granger Morgan et al. (2002), the central message in the U.S. Environmental Protection Agency's 1986 *Citizens' Guide to Radon*—"You should test your house for radon"—may have been undermined by the public belief that testing was futile. Better messages would have been that radon decays over time and that inexpensive devices are available to monitor radon levels in homes.

When the mental models process was used with teens for HIV/AIDS awareness, it showed that teens already understood the big picture about HIV/AIDS, but they needed to have information gaps filled and misconceptions corrected. Thus, rather than repeating familiar HIV/AIDS facts, communication materials used messages such as "Knowing your partner is not enough to prevent HIV," "The more times you have sex with an HIV-infected person, the more likely you are to get HIV," and "The only way to know if you have HIV is to be tested."

A mental models process about climate change risks led to communication materials that directly addressed common misconceptions. The materials used messages such as "Climate change and the loss of the ozone layer are two different problems that are not very closely connected," "Using aerosol spray cans has almost no effect on climate change," and "Nuclear power does not contribute to climate change."

A mental models process about health risks from electric power fields led to messages such as "The strength of electric fields decreases rapidly as you move away from them." Figure 14.1 later in this book shows an illustration that was created to convey this message.

As with any other technique, the mental models approach has its limitations. In one study, mental models interviews were used to design materials to explain electroplating risks. Consequently, electroplating workers showed a better understanding of long-term health effects and were more aware of precautions to take in the plating shop that were not based on direct experience (Petts et al. 2002). However, the researchers also raised several cautions about the mental models approach. For example, the approach may incorrectly assume that all expert beliefs are consistent, may undervalue layperson knowledge and belief, and may skip over behavioral and organizational culture issues, especially in the workplace. The researchers endorsed the user-centered approach for designing risk information, but with these added guidelines:

- Focus not only on what people believe but also on why and how they reduce risks.
- Include divergent views related to demographics, length of work experience, and disability.
- Realize that there may be more than one expert model, for example, for occupational health experts and factory inspectors, and that the expert

model of hazards and risk reduction may not be better than those held by an industry worker.

- In presenting risk information, answer key questions such as the following: How might this happen? What can it to do me? How can I protect myself?
- Test whether new risk messages affect behavior, not just improve understanding.

MESSAGE MAPPING AND MESSAGE DEVELOPMENT TEMPLATES

Risk communication consultant Vince Covello developed the concept of a message map. It is a template for displaying detailed, hierarchically organized responses to anticipated questions or concerns. Message maps are one way to make sure that everyone understands the organization's messages for high concern or controversial issues.

> A message map is a template for displaying detailed, hierarchically organized responses to anticipated questions or concerns.

Message maps should be created with interested and affected parties, including scientists, communication specialists, and policy experts as applicable. Broad involvement will reveal a diversity of viewpoints, but the end goal is to come up with messages and supporting points with which everyone agrees.

Start by developing a list of anticipated questions, to identify common sets of underlying concerns. Develop key messages in response to the underlying concerns and questions. Each key message should have up to three supporting facts associated with it. To reduce confusion and increase comprehension and retention, Covello recommends limiting the number of key messages and keeping them at a middle-school level of readability. Table 9.1 shows an example of a message map to answer the question, "How contagious is smallpox?"

HEALTH RISK COMMUNICATION

Public-health-related messages are similar to other risk messages, but with the added goal of human behavioral change. Though health messages often contain an element of persuasion, they should still be based on understanding the audience's concerns, needs, and incentives to act. Health communication researchers Kim Witte et al. (2001) recommend a detailed process for audience analysis and message development, based on communication research:

- Identify the health threat, recommended response, and target audience.
- Conduct formative research about the target audience's beliefs about the threat, including beliefs to change, reinforce, or introduce. Develop one or

Table 9.1. Sample Message Map. Stakeholder: General Public. Question: How Contagious Is Smallpox?

Key message 1	Key message 2	Key message 3
Smallpox spreads slowly compared with measles or the flu	This allows time for us to trace contacts and vaccinate those people who have come in contact	Vaccination within 3–4 days of contact will generally prevent the disease
Supporting fact 1-1	Supporting fact 2-1	Supporting fact 3-1
People are only infectious when the rash appears and they are ill	The incubation period for the disease is 10–14 days	People who have never been vaccinated are the most important ones to vaccinate
Supporting fact 1-2	Supporting fact 2-2	Supporting fact 3-2
It requires hours of face-to-face contact	Resources for finding people are available	Adults who were vaccinated as children may still have some immunity to smallpox
Supporting fact 1-3	Supporting fact 2-3	Supporting fact 3-3
There are no asymptomatic carriers	Finding people who have been exposed and vaccinating them is the successful approach	Adequate vaccine is on hand, and the supply is increasing

Source: Centers for Disease Control and Prevention et al. (2003)

more audience profiles of "typical" members of your target audience, including lifestyle practices, cultural beliefs, religious values, and so on.

- List the source, channel, and message preferences, making sure that they fit with the audience's values, demographic characteristics, and needs.
- Determine the stage of change readiness (unaware of or apathetic about the health threat, considering change, preparing to change, ready to take action, and behavior maintenance) for your profiled audience members and list ideas for moving them to the next stage.
- Develop and test messages using the above research and using communication theories that address persuasion and behavior change.
- Deliver the message and measure belief and/or behavior change results.

The University of Toronto's Health Communication Unit promotes the following tips for health message development, also based on communication research:

- **Capture and maintain the audience's attention.** The more you can engage the audience to think about the message, the more likely they are to change knowledge attitudes and behaviors. Consider using emotionally involving scenes, vivid visuals, and lively language.

- **Give the strongest points at the beginning of the message.** This is the information most critical for convincing the audience to adopt the recommended behavior.
- **Have a clear message.** People should easily understand the actions you are asking them to take and the incentive for taking them.
- **Specify a reasonably easy action.** Instead of telling people to stop smoking, which many people will ignore as unattainable, you could ask them to sign a pledge card or commit to a smoke-free week, or give them tips for the first day of smoking cessation. It also helps to show role models demonstrating the desired behavior.
- **Use incentives effectively.** Use a variety of incentives, including physical, economic, psychological, social, and moral. Make sure that the audience cares about the incentives and thinks that they are likely to occur if the behavior changes.
- **Provide good evidence for threats and benefits.** People who are already interested tend to respond to expert quotes, documentation, and statistics. People who are not involved are more likely to respond to dramatized case examples and testimonials.
- **Use believable messages.** Do not make extreme claims or use extreme examples.
- **Use an appropriate tone for the audience and topic.** A serious tone is the safest, but do not preach or dictate. Some audiences may respond to a light, humorous, ironic, or dramatic tone.
- **Use an appropriate appeal for the audience.** Consider rational appeals for audiences already interested in the topic and emotional ones for the apathetic.
- **Do not offend.** Do not blame the victim for unhealthy behavior. Help people overcome their environments instead.
- **Display the organization's identity prominently with each message**. Identity elements could include an organization's name, a positioning statement or platform, a logo, a slogan, and, sometimes, an image. Identity elements that help people remember and link the campaign messages over time.
- **Choose messengers who are viewed as credible sources of information by the intended audiences.** Messengers are those who deliver information, demonstrate behavior, or provide a testimonial. Messengers could range from celebrities to public officials to victims to successful role models. Messenger credibility is enhanced by perceived expertise and honesty, as well as being viewed as similar to the target audience.

One approach to communicating health risk communication messages is commonly called single overriding communication health objective (SOCHO). The idea is that the risk should be boiled down into a single most important message and that the message should be repeated until the audience takes some action (stops smoking, joins a community advisory group, evacuates, etc.). Knowing the most important message can help to keep a risk communicator focused, particularly during face-to-face interactions (see Chapter 15) and interactions with the news media (see Chapter 16). It can also help determine the central intended message. Unfortunately, the SOCHO approach has two main drawbacks:

1. It is difficult to distill complex situations into a single message.
2. Flogging the audience with a single message incessantly will not answer questions, resolve issues, or further the goal of supporting continued sharing on all sides (Bennett and Calman 1999). Indeed, many members of the news media now recognize the practice and will only push harder for another answer.

It is better to understand what your audience wants to know and craft a set of messages that cover all aspects of the risk than to rely on a single message to see you through.

See Chapter 24 for more details on messaging in public health campaigns.

CRISIS COMMUNICATION

In crisis communication, the tone should create a sense of urgency to take action when appropriate and reassure people that answers are being sought, without confusing or alarming them. In some crises, the danger is known in advance (for example, in a flood or hurricane). For example, the UK Environmental Agency (n.d.) found that flood warning messages were more effective if they were tailored to local situations, centered on response, and considered people with special needs.

> In the absence of consistent, trustworthy messaging from government authorities, members of the public may act in ways that put them in harm's way.
> —Center for Biosecurity (2012, p. 3)

Dennis Mileti, Professor Emeritus at the University of Colorado at Boulder, and his colleges at the National Hazards Research and Applications Information Center, have conducted research on how people heed warnings of impending danger. Looking across warning research, regardless of hazard, he found that audiences need five things from message content: information on hazard, location, guidance on actions to take, timing, and source (the organization providing the warning). Warning messages were particularly effective when they were

- specific
- consistent
- certain
- clear
- accurate
- sufficient (contained enough details)
- repeated frequently (Mileti and Peek 2000)

More information was always better. Audiences crave information in a crisis.

The CDC et al. (2003) recommend the following process for message development during a crisis, especially one involving an infectious disease or other public health issues:

- **Describe the audiences you want to reach.** This includes their relationship to the event, their demographics (age, language, education, culture), and their level of outrage, based on risk communication principles.
- **Define the purpose of the message(s).** Purposes could include giving facts and updates, rallying people to action, clarifying event status, addressing rumors, and responding to media requests.
- **Identify the delivery method.** This could include media, the Internet, a spokesperson, recorded phone messages, public meetings, and other methods.

Once you have identified the audience, message purpose, and delivery method, construct messages using the following components:

- Expression of empathy
- Facts and/or call to action
- What is not known and the process needed to get answers
- Statement of commitment from the organization
- Referrals to others for more information
- Next scheduled update

Keep the content easy to understand and free of jargon. Convey what science knows and does not yet know about the risk.

Experiences after the Oklahoma City bombing and other mass casualty events show that people's ability to process information decreases significantly in the face of tragedy. In such cases, messages need to be simple and few in number, and any verbal messages must be reinforced in writing (Blakeney 2002). In addition, use repetition and include relevant and practical actions to help people understand what they should do to protect themselves and their loved ones. What people most want is actionable advice (Center for Biosecurity 2012).

In a media or hotline situation, spokespeople and other organization representatives should practice answering questions that reflect the messages. It is especially important to make sure that everyone is "singing off the same page" when more than one agency or organization is involved because receiving conflicting information from various agencies confuses people and diminishes trust. The European Food Safety Authority advises developing "holding statements" during emergency response planning. These are statements that can be used by multiple agencies to address questions raised by the news media and the public regarding the emergency. Examples cover emerging, evolving, and widespread emergencies (EFSA 2016). For more information about responding to questions in crises, see Chapter 22.

One form of crisis communication requires special attention: the wireless emergency alert. These are short-form messages sent to cell phones, social media platforms, or other electronic means to share information about an unfolding emergency. The messages generally contain a statement of the type of emergency (flood, fire, storm, industrial accident), the appropriate response (evacuate, shelter in place, relocate), and possibly the duration (for the next hour, for the next week). Research at the Pacific Northwest National Laboratory suggests that these messages could be more effective if they contain specific actions and include location-relevant information (Corley et al. 2016).

CHECKLIST FOR DEVELOPING MESSAGES

When developing and delivering messages:

☐ The purpose of the message has been identified.
☐ The appropriate approach for care, consensus, or crisis communication has been chosen.
☐ Audiences and their knowledge, beliefs, concerns, customs/culture, and barriers to action have been analyzed, with their input.
☐ Special attention has been paid to misperceptions and knowledge gaps, potential unintended consequences, and beliefs to be reinforced.
☐ Message content and delivery are based on an understanding of the audience and are pretested.
☐ Evaluation methods are in place to determine the effectiveness of messages and modify them if necessary.

REFERENCES

Bennett, P. and K. Calman. 1999. *Risk Communication and Public Health*. Oxford University Press, New York.

Blakeney, R. L. 2002. "Providing Relief to Families after a Mass Fatality: Roles of the Medical Examiner's Office and the Family Assistance Center." OVC Bulletin, November.

Center for Biosecurity. 2012. *After Fukushima: Managing the Consequences of a Radiological Release*. University of Pittsburgh Medical Center, Baltimore, Maryland.

CDC (Centers for Disease Control and Prevention), Agency for Toxic Substances and Disease Registry, Oak Ridge Institute for Science and Education, and The Prospect Center of the American Institutes of Research. 2003. Emergency Risk Communication CDCynergy, and subsequent iterations. See, for example, https://emergency.cdc.gov/cerc/index.asp (accessed October 15, 2017).

CDC. 2008. Risk Communicator: The RC, Issue 1, pp. 8–10.

Corley, C. D., N. O. Hodas, R. S. Butner, J. J. Harrison, and C. Berka. 2016. *Modeling Cognitive Response to Wireless Emergency Alerts to Inform Emergency Response Interventions*. Pacific Northwest National Laboratory, Richland, Washington.

EFSA (European Food Safety Authority). 2016. *Best Practices for Crisis Communicators: How to Communicate During Food or Feed Safety Incidents*. EFSA, Parma, Italy.

Fischhoff, B. and J. Downs. 1997. "Accentuate the Relevant." *Psychological Science*, 8 (3): 1–5.

Green, J. A., N. K. Choudhry, E. Kilabuk, and W. H. Shrank. 2010. "Online Social Networking by Patients with Diabetes: A Qualitative Evaluation of Communication with Facebook." *Journal of General Internal Medicine*, 26 (3): 287–292.

Hart, P. S. 2014. "Boomerang Effects in Risk Communication." In J. Arvai and L. Rivers, III, eds., *Effective Risk Communication*, Routledge, New York, pp. 304–318.

Kahlor, L., S. Dunwoody, R. J. Griffin, K. Neuwirth, and J. Giese. 2003. "Studying Heuristic-Systematic Processing of Risk Communication." *Risk Analysis*, 23 (2): 355–368.

Leiss, W. and D. Powell. 2004. *Mad Cows and Mother's Milk: The Perils of Poor Risk Communication*, 2nd ed. McGill-Queen's University Press, Montreal, Quebec, Canada.

Lion, R., R. M. Meertens, and I. Bot. 2002. "Priorities in Information Desire about Unknown Risks." *Risk Analysis*, 22 (4): 765–776.

Mileti, D. S. and L. Peek. 2000. "The Social Psychology of Public Response to Warnings of a Nuclear Plant Accident." *Journal of Hazardous Materials*, 75 (2000): 181–194.

Morgan, M. G., B. Fischhoff, A. Bostrom, and C. J. Atman. 2002. *Risk Communication: A Mental Models Approach*. Cambridge University Press, Cambridge, UK.

NewsMedical.net. 2013. "Researchers Present Research Outcomes on Food Risk and Benefit Communication Created by FoodRisC." https://www.news-medical.net/news/20130913/Researchers-present-research-outcomes-on-food-risk-and-benefit-communication-created-by-FoodRisC.aspx (accessed August 7, 2017).

Petts, J., S. McAlpine, J. Homan, S. Sadhra, H. Pattison, and S. MacRae. 2002. Development of a Methodology to Design and Evaluate Effective Risk Messages:

Electroplating Case Study. Prepared by the University of Birmingham for the Health and Safety Executive of Great Britain. Edgbaston, Birmingham, U.K. Contract Research Report No. 400.

Salmon, C. T., S. Byrne, and L. Fernandez. 2014. “Exploring Unintended Consequences of Risk Communication Messages.” In J. Arvai and L. Rivers, III, eds., *Effective Risk Communication*, Routledge, New York, pp. 292–303.

Tucker, W. T. and S. Ferson. 2008. “Strategies for Risk Communication: Evolution, Evidence, Experience.” *Annals of the New York Academy of Sciences*, 1128: 1–7.

UK Environmental Agency n.d. “Improving Institutional and Social Responses to Flooding.” Science Summary SCHO0509BQBM-E-P. UK Environmental Agency, London.

Witte, K., G. Meyer, and D. Martell. 2001. *Effective Health Risk Messages: A Step-by-Step Guide*. Sage Publications, Thousand Oaks, California.

ADDITIONAL RESOURCE

New York State Health Department n.d. “How to Craft Effective Health Messages for People with Disabilities.” http://www.health.ny.gov/publications/0957/ (accessed November 13, 2017).

10

DETERMINE THE APPROPRIATE METHODS

You know what you are trying to communicate and why and to whom you will be sharing the risk information. Now you need to decide how to communicate. Which methods of communication will best meet both your purpose and objectives and your audience's needs? (Usually, no one method will meet the needs of every segment of your audience.) The basic categories to choose from include information materials, visual representation of risk, face-to-face communication, working with the news media, stakeholder participation, technology-assisted communication, social media, and partnerships.

How each of these relates to the purpose and objectives and audience's needs is discussed later in this chapter, as well as the time involved and how much technical knowledge is needed to effectively share risk information. More information on using each of the methods can be found in Part III.

INFORMATION MATERIALS

Information materials are those that your audience will need to read and are generally printed. These materials may have pictures and other graphical

---

Risk Communication: A Handbook for Communicating Environmental, Safety, and Health Risks,
Sixth Edition. Regina E. Lundgren and Andrea H. McMakin.
© 2018 The Institute of Electrical and Electronics Engineers, Inc., and Regina E. Lundgren
and Andrea H. McMakin. Published 2018 by John Wiley & Sons, Inc.

elements, and they range in size from a partial-page advertisement to a multivolume environmental impact statement. Examples include newsletters, fact sheets, brochures, booklets, pamphlets, displays, advertisements, posters, trade journal articles, popular press articles, and technical reports.

Information materials are those that your audience will need to read and are generally printed. Examples include newsletters, fact sheets, brochures, booklets, pamphlets, displays, advertisements, posters, trade journal articles, popular press articles, and technical reports.

Information materials have the advantage of being able to include a wealth of information. They also can be expanded or condensed to meet audience needs (for instance, a technical report can be condensed into a journal article or news release, depending on the audience). Information materials used to be some of the most inexpensive to produce, but rising paper and distribution costs can make the widespread availability expensive, unless you opt for delivering the materials electronically.

However, information materials can be a comfortable form of communication for some members of the audience; they are more familiar than a computer station and allow the reader to carry away something for later reference. So, if your objectives are to disseminate a large amount of risk information and to economically meet the needs of various segments of your audience, then information materials may be a good choice.

On the other hand, some information materials can be difficult for certain members of the audience to comprehend. When writing such messages, it is too easy to resort to jargon and overly technical language ("if they don't understand it, they can look it up"). In addition, the length of information materials (either too short or too long) can deter some readers. Then, too, many people today cannot find time to read or no longer seek information in printed materials. So, if your purpose is to raise awareness of an issue or to communicate with people who have difficulty reading, information materials may not be the best choice.

Depending on their length, the amount of research needed, the approval process, and the method of printing, information materials can usually fit into any schedule. For broad, quick dissemination, newspaper articles may have a large readership and may be published daily; however, you often do not control content or timing (see Chapter 16 for additional information). Fact sheets and pamphlets can also usually be prepared relatively quickly. For a risk that will take some time to resolve and that includes audience involvement throughout, such as the cleanup of a waste site, a newsletter may be a good choice, supplemented by a variety of other methods.

To prepare any form of information material, some technical knowledge is necessary. A technical writer can prepare the information and have experts review it for technical accuracy, or the experts can prepare the message and have a technical communications specialist or risk communicator review it to ensure that it meets the audience's needs. Although there may be a fine line between being overly technical and overly simplistic, it is possible to present technical information in a way that the public can understand. Lay readers may not understand the information in the same way that an expert with 35 years of experience in the field understands it, but they can understand it at a level that allows them to make an informed decision about the risk. See Chapter 21 for advice on how to pretest such materials to ensure that they meet audience needs.

VISUAL REPRESENTATION OF RISK

Risk can also be communicated through the use of graphical elements and relatively little text to carry simple risk messages. Examples include posters, displays, direct advertising, videos, and images in social media; however, virtually all forms of risk communication make some use of visual representation of risk.

Visual representations have the advantage of being memorable. Think of traffic safety signs. The use of graphical elements like color, shape, and imagery along with compelling language can bring simple risk messages to life with stunning clarity. Visuals may be culture specific; however, because they contain very little written information, they can usually be more easily translated into another language than other information materials. They can be placed where your audience lives, works, and plays: in targeted social media feeds, on posters in work cafeterias, and on buses and bulletin boards. So, if your purpose is to raise awareness, visual representations may be the best choice.

> Risk can also be communicated through the use of graphical elements and relatively little text to carry simple risk messages. Examples include posters, displays, direct advertising, videos, and images in social media; however, virtually all forms of risk communication make some use of visual representation of risk.

Visual representations, by their very nature, can carry only limited information. Therefore, they cannot answer as many of the questions audiences may have about the risk as some other forms of risk communication. Because the style of these pictures is sometimes associated with persuasive communications (like product advertisements), they may fail to attract or may even put off certain elements of the audience ("oh, it's just more hype"). If they are overused, they lose their impact and tend to be ignored. Even television programming and online videos, which can overcome some of these problems, are often viewed as merely entertainment so that the risk messages get lost among the commercials for crunchy munchies or the latest viral dance video. So, if your purpose is to inform your audience, visual representations cannot be your only choice of method.

Visual representations, by their very nature, can carry only limited information. Therefore, they cannot answer as many of the questions audiences may have about the risk as some other forms of risk communication.

Visual representations can take some time to produce. Although organizations that regularly produce public service announcements for television can turn them out in a few weeks, those of us with more limited staff and budgets often cannot match this schedule. Coordinating the production of graphics or video can take a significant amount of time, when you are trying for quality. (Certainly, many online videos are shot more simply, stock photos can be licensed quickly, and some visuals are available for free through mechanisms such as Creative Commons.) Nonetheless, to meet your audience's needs and your purpose and objectives, you may want to investigate how much time and money are necessary for the production of visual messages. Contact your public affairs or communications departments, or get recommendations from colleagues for graphic artists, photography, or advertising services, to gather cost and time estimates.

Even though the technical message is usually somewhat limited, some technical knowledge is necessary to produce most visual representations. To ensure that the message is technically correct and does not imply something that is incorrect, have people with technical backgrounds review the message and graphics. Knowledge of graphic design, however, is critical to ensure that these messages carry the impact intended. If you do not have a background in graphic design, contact your organization's art department or search online for advertising, graphic art services, or graphic designers. See Chapter 14 for more information on the visual representation of risk.

FACE-TO-FACE COMMUNICATION

Face-to-face communication involves someone speaking directly to the audience or listening while the audience speaks. Usually, the audience and the speaker do not interact, except perhaps to ask questions. (Cases in which the audience can interact are classified in this book as stakeholder participation.) Examples include one-to-one discussions such as between a doctor and a patient or between employees; presentations to clubs, societies, and citizens groups, whether as a single speaker or as part of a speakers bureau; talks in educational settings such as grade school, college classes, or training courses; tours and demonstrations; live video; audience interviews; and information fairs. Face-to-face communication has the advantage of having an identifiable human representative of the organization or another credible person presenting the risk information, thus personalizing it. (Of course, if the presenter lacks credibility, the presentation can have a negative effect!) Face-to-face communication generally offers the opportunity for immediate audience feedback, if not through questions then through the audience's visible reaction to certain statements. Some audience analysis information is generally available beforehand to the presenter (who can ask questions of the person arranging or hosting the presentation), allowing each presentation to be tailored. You can also target specific groups to receive an oral message, whereas you may have no way of knowing whether the people to whom you sent a written message ever read it. Face-to-face communication can also be presented in the language of the audience. So, if your objectives are to present information in a forum that allows immediate feedback and to target specific groups, face-to-face communication may be your best choice.

Face-to-face communication involves someone speaking directly to the audience or listening while the audience speaks. Usually, the audience and the speaker do not interact, except perhaps to ask questions.

On the other hand, face-to-face messages can also be easily misunderstood. Audiences may be too overwhelmed or hostile to ask questions that would clarify misunderstandings. Particularly angry audiences can turn a presentation into a political forum and generally refuse to listen. Oral presentations alone also give the audience nothing to refer to later. So, if you have a particularly angry audience, or one that needs long-term information, face-to-face communication may not be satisfactory or sufficient.

Face-to-face communication can fit into nearly any schedule. For quickly disseminating information, a press conference or radio announcement is useful. For a longer-term effort, a continuing series of presentations to a variety of organizations and societies might serve to reinforce the message and keep the audience up to date. Another way to reinforce face-to-face communication is to encourage health care professionals to disseminate risk information to their clients at risk.

Advanced technical knowledge is usually necessary to present oral risk information convincingly. However, the ability to speak in a manner that entertains as well as informs is also necessary. No matter how well educated, an expert who has trouble speaking before groups is a poor choice for spokesperson. So is a professional speech maker with only superficial knowledge of the risk. The best person to present oral risk information is one whom the audience will find credible and whom the organization responsible for communicating risk finds an acceptable representative. For more information on choosing a spokesperson, see Chapter 15.

THE NEWS MEDIA

Mass media methods usually involve the use of sources such as television, newspapers, radio, magazines, online news sites (including topic-specific blogs), and news apps to communicate risk information to broad audiences. Such sources can be powerful because they reach large audiences and can be memorable and credible for many people. Television, radio, and the Internet are particularly useful sources in crisis communication situations in which people need continuously updated information quickly. (Social media is discussed on p. 163.)

A key disadvantage of mass media is that, except in paid advertisements and other limited circumstances, the media source controls the content and timing of the story. Because of time constraints and the missions of media organizations, aired or published stories on risk-related issues may not contain the emphasis or depth of information that those who communicate risk would like to see. Thus, the media should not be relied upon as the sole source of information in planning risk communication efforts.

Because of its wide reach and powerful impact, the use of mass media should be considered carefully as risk communication plans are being prepared. Even a small amount of negative coverage can torpedo the best-planned effort and destroy trust and credibility among the audiences and participants you are trying to reach. On the other hand, productive relationships with media representatives can lead to a more informed, solution-oriented public.

> Mass media approaches usually involve the use of sources such as television, newspapers, radio, magazines, and the Internet to communicate risk information to broad audiences. Such sources can be powerful because they reach large audiences and can be memorable and credible sources for many people.

Schedules for planning and implementing media interactions and products can vary widely. On one hand, it may take only a half hour to talk with a reporter about a specific topic and perhaps follow up by sending background materials. In a crisis situation, you are usually working within a short time frame to prevent or mitigate a problem. The time involved in a crisis communication situation may be driven in part by a prescribed series of steps designated in company procedures. The unplanned nature of a crisis, however, makes timing unpredictable. Media follow-up after a crisis event, especially if an organization was perceived as mishandling the situation, may require much more time than it took to communicate during the actual crisis.

A formal event such as a press conference may require several days to plan and coordinate. Working cooperatively with a local newspaper to communicate about an issue that affects the community may span several weeks or months. Creating your own media messages for a public health campaign usually requires weeks or months of coordination and production. See Chapter 24 for more information on public health campaigns.

Developing mutually productive working relationships with reporters is an ongoing effort for many organizations. Though this means vigilantly contacting media representatives to update them on breaking news or to suggest story ideas at appropriate times, the resulting quality of the media coverage often is well worth the time involved.

Many organizations require approvals of internal management when employees are working with external media professionals. When planning media interactions, include appropriate time up front for approvals and review of any information materials you plan to give to the media. Be aware that additional time may be necessary to search for or revise materials to be suitable for a particular medium. For example, newspapers may want a "people" photo rather than a technical illustration. Television reporters may ask if you can provide high-quality video clips or, more likely, ask to shoot their own footage.

Several kinds of costs are involved in media interactions, depending on the type and duration of the activity. First are labor costs. Often, a specialist trained in media relations is needed to plan and coordinate efforts, including creating media plans. There is also the time of those who are talking with media representatives. Production costs are necessary for creating materials such as press releases, press kits, advertisements and public notices, photos, and video footage. Formal events such as press conferences may require room and equipment rental.

Working with the media does not have to be expensive. Even a small organization can communicate important risk information to an audience of thousands through one radio, television, or newspaper interview, for only the few minutes it takes to speak with a reporter. The key in budgeting for media interactions, as in other types of communication activities, is to define your goals and target specific activities to meet them. Media specialists or consultants can help find the greatest value within a budget that you specify. Chapter 16 gives examples of ways to work with media representatives in specific situations.

Those who are communicating directly with media representatives should have at a minimum a basic technical knowledge of the risk situation so that they can answer technical questions with accuracy and credibility. Equally important, however, are an understanding of media organizations and the ability to use language that the media outlet's audience will understand and relate to. When the person speaking is officially representing the company's position, follow the guidance in the section "Choose the Appropriate Spokesperson" in Chapter 15. Chapter 16 provides guidance in understanding media practices and in using appropriately targeted language.

Those who are producing materials for media use should have the professional skills needed to create high-quality products for the target medium. A person with subject matter knowledge of the issue being portrayed should review the materials for technical accuracy.

STAKEHOLDER PARTICIPATION

Stakeholder participation involves the audience in some way in the discussion, analysis, or management of the risk. Examples include advisory committees, facilitated deliberation, alternative dispute resolution, focus groups, community-operated environmental monitoring, and formal hearings in which the audience is invited to give testimony.

Stakeholder participation involves the audience in some way in the discussion, analysis, or management of the risk. Examples include advisory committees, facilitated deliberation, alternative dispute resolution, focus groups, community-operated environmental monitoring, and formal hearings in which the audience is invited to give testimony.

The advantage of stakeholder participation is that the audience can see for themselves exactly what is known about the risk, how the risk will be managed, and how decisions are reached. Because they can participate in the risk decision, it is likely to be more acceptable and lasting. Stakeholder participation can be structured to accommodate a variety of audiences, including those that are hostile or have difficulty reading or understanding other forms of communication. So, if one of your objectives is to increase the chances that your risk decision will be one that meets the needs of the audience, stakeholder participation may be the best choice.

However, stakeholder participation can be a frightening proposition to some risk managers. They fear the loss of control over the risk decision, instead of seeing that the audience's input can be invaluable to a lasting, equitable decision. If there is no commitment to stakeholder participation from those who are analyzing the risk, managing the risk, or making the decision, the effort can be devastating to an organization's credibility and hamper any future risk communication or management efforts. Stakeholder participation is generally more costly than simply issuing a technical report or holding a press conference. So, unless your organization is completely committed to letting the audience interact in a way that is meaningful to that audience, stakeholder participation is a very poor choice. See Figure 10.1 to determine whether stakeholder participation can be used effectively in your situation.

Stakeholder participation is usually a long-term proposition. Unless the structure for interaction is already functioning (such as an advisory committee), one cannot be put in place quickly enough to release urgent information. Stakeholder participation can usually only be used effectively when the risk management and risk communication effort will occur over time.

Little technical knowledge about the risk is required to set up stakeholder participation; however, technical staff and management must participate for the interaction to have meaning. In addition, knowledge about stakeholder participation (sometimes called public involvement) is necessary to structure the interactions effectively. Groups such as the International Association for Public

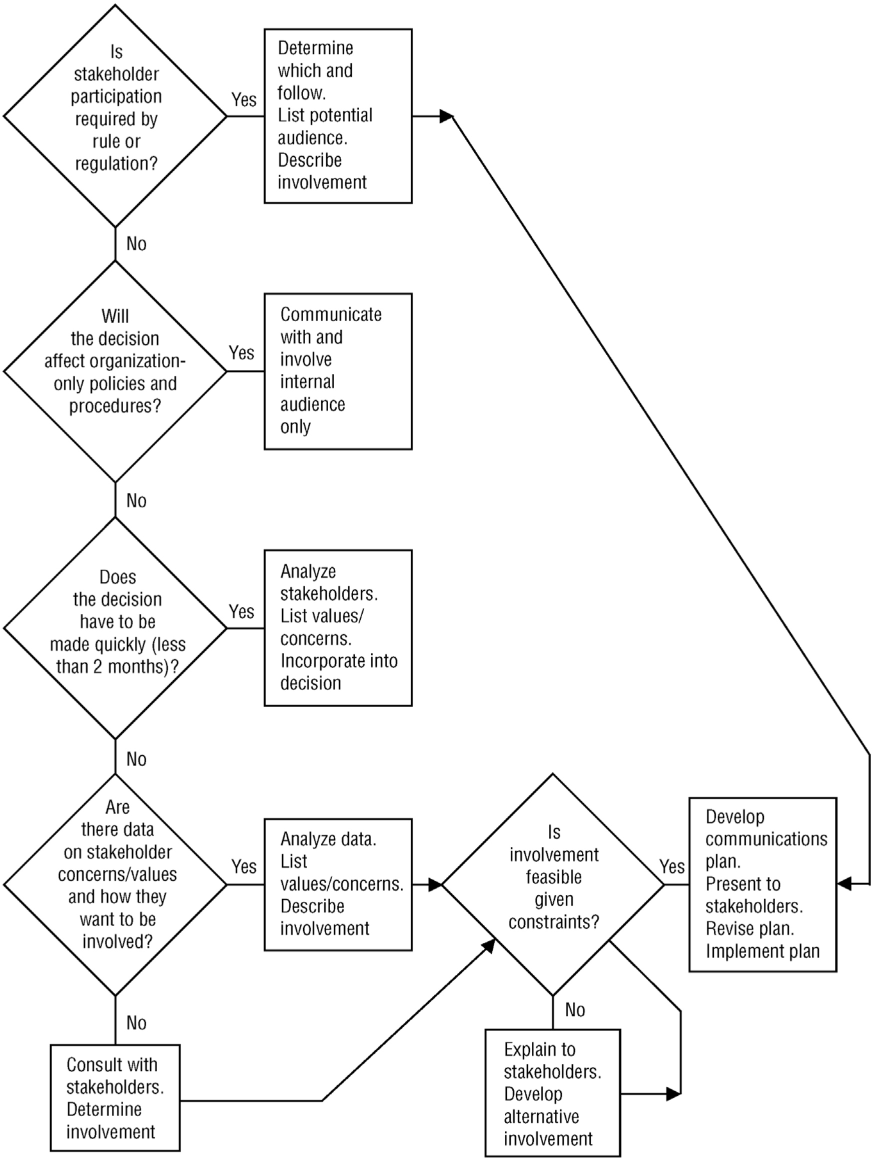

Is stakeholder participation required by rule or regulation?
Yes
Determine which and follow. List potential audience. Describe involvement
No
Will the decision affect organization-only policies and procedures?
Yes
Communicate with and involve internal audience only
No
Does the decision have to be made quickly (less than 2 months)?
Yes
Analyze stakeholders. List values/ concerns. Incorporate into decision
No
Are there data on stakeholder concerns/values and how they want to be involved?
Yes
Analyze data. List values/concerns. Describe involvement
Is involvement feasible given constraints?
Yes
Develop communications plan. Present to stakeholders. Revise plan. Implement plan
No
Explain to stakeholders. Develop alternative involvement
No
Consult with stakeholders. Determine involvement

Figure 10.1. Determining when to use stakeholder participation to communicate risk.

Participation evolved to develop and disseminate information concerning stakeholder participation. See Resources at the back of this book for contact information. See Chapter 17 for additional information on involving stakeholders in risk efforts.

TECHNOLOGY-ASSISTED COMMUNICATION

Technology-assisted communication uses technology, often computer based, to discuss or disseminate risk information, or allow a member of the audience to query and receive a variety of information about the risk. For example, one software application allows audience members to evaluate a number of factors to help experts identify the technologies that are more acceptable to the public for cleaning up a waste site.

Technology-assisted communication has the advantage of being able to disseminate an incredible amount of information, which members of the audience can tailor to their individual needs. Once developed, technology-assisted communication can be updated and revised more easily than materials developed through any of the other risk communication methods so that it is always current, a plus in the area of risk, which can change hourly. If graphic elements are properly built in, these applications can be as eye-catching as full-color ads or displays, yet carry as much information as traditional information materials or even more. Speeches, video, animations, and other multimedia elements can be incorporated, making the applications incredibly versatile. So, if your objectives are to allow people to see all the data and develop their own perceptions of the risk, to disseminate information quickly, or to cost-effectively involve your audience, technology-assisted communication may be a good choice.

> Technology-assisted communication uses technology, often computer based, to discuss or disseminate risk information, or allow a member of the audience to query and receive a variety of information about the risk.

However, technology-assisted communication has several disadvantages. Those applications that must run on a fairly sophisticated computer make mass dissemination impractical. In addition, computer use in the United States is still less than universal, making it difficult to reach all audiences with a computer-based application. So, unless your audience has ready access to the appropriate devices and software, you may not want to rely on technology-assisted communication as your primary method.

Technology-assisted communication is becoming easier to produce every day. However, some types of applications still cannot be developed in time to meet the goals of short-term schedules. In addition, unlike information materials that are eventually used up, these applications must be kept up to date or audiences will lose interest.

Some applications, such as websites, require relatively little technical knowledge of computers to develop. Depending on the purpose of the site, little risk information is needed as well (for example, setting up a computer bulletin board to log in stakeholder comments on an environmental impact statement). However, a computer application that incorporates risk modeling requires a great deal of technical knowledge, not only about the risk but also about the application. Often, such models are developed by teams, with each member specializing in a particular area such as technical communication, computer programming, and risk assessment. If your organization does not have such experts, contact colleges and universities for help. See Chapter 18 for additional information.

SOCIAL MEDIA

In risk communication, social media platforms enable organizations and individuals to connect with each other to share information about risks via text, graphics, and video. For example, teens facing diabetes might join a social media network group to share diet and exercise tips and support each other in meeting health goals.

Using social media to communicate risk has several advantages. Because the audience chooses to engage in a conversation about the risk, their level of interest is high, and, for care and crisis communication, that interest might translate into a willingness to change behavior and improve health and safety. Social media also has the expectation from the audience's side that it will be immediate. Information can be posted quickly and updated as needed. Feedback is also instant, and changes in opinions, as measured by topics of conversation, can be tracked over time. So, if your objectives are to engage your audience in ongoing conversation and to determine how their perceptions shift, then social media could be a good choice.

Social media platforms enable organizations and individuals to connect with each other to share information about risks via text, graphics, and video.

While social media can be an important mechanism to share information, it has some drawbacks. The audience generally has to be connected with your feed, or find your page, profile, or app, and research has yet to confirm how people determine a particular site or profile to be credible. That audience also has the growing expectation that a social media platform is always "on." That is, if your organization has a presence on a social media site, someone will always be available to answer questions or otherwise engage in conversation. On the other hand, not everyone can access social media, and certain demographics are less likely to use the sites than others. In addition, the fact that the information is in the audience's control can concern some organizations charged with communicating risk. So, if your audience does not seek information about your risk in social media or your organization is unwilling to make the commitment to the medium, then social media may be a poor choice.

Social media looks deceptively easy. Most accounts can be set up in minutes. But extra time is needed before joining the sites to ensure that organizational policies and procedures are in place to maintain the effort. In addition, social media requires maintenance on a daily basis, and, once the engagement starts, there may be an expectation from the audience that it will never end.

Little technical knowledge is needed to interact with the audience on social media; however, being able to tap into a wealth of information from a variety of disciplines can be very helpful in addressing audience questions and positioning your organization as an expert on your risk. In addition, not everyone is comfortable representing their organization on social media. Poor social skills will be visible immediately, alienating the audience. You may need to look beyond those traditionally tasked with risk communication to find advisors in social media engagement. For more information on using social media to communicate risk, see Chapter 19.

PARTNERSHIPS

Partnerships involve working with organizations outside yours to develop and share risk information. An agency may partner with a key blogger in the field to raise awareness of risk issues. Federal, state, and local agencies may partner with faith-based organizations for help in times of crisis. Public health organizations may enlist community members to canvas opinions and expectations to develop effective risk communication campaigns.

> Partnerships involve working with organizations outside yours to develop and share risk information.

Partnerships hold the advantage when it comes to sheer numbers. Research institutions and universities offer subject matter experts in a host of disciplines. Community members can staff hotlines that would go unanswered otherwise. Partnerships can also serve as an extremely effective way to reach thousands or even millions of people by disseminating information to their constituencies. When the hazard is bigger than any one group can handle, such as in crisis situations, partnerships are a must. So, if your objective is to reach a wide number of people or augment your staff to tackle a particularly challenging hazard, then partnerships may be an excellent choice.

Partnerships, however, are fraught with challenges. Not all agencies and organizations deal well as equal partners. Some will want larger roles, including control of the message or approval processes. Personalities can also clash, making teaming difficult. Industry partners may hesitate to share proprietary information key to the communication effort. Agencies may not be able to share resources as easily as some partners might expect. Then too, partnerships take a level of commitment some organizations are unwilling or legally unable to provide. So, if your goal is to disseminate risk information quickly while maintaining control of resources, funding, and content, partnerships may not be the best choice.

Like stakeholder participation, partnerships are generally longer-term propositions. It can take weeks to months to research and approach a partner, with additional time needed to come to consensus on each partner's roles, expectations, and contributions. The partnership must be maintained through frequent interactions, such as phone calls, meetings, trainings, and exercises. The investment is worth the effort, particularly in crisis communication, so that everyone does his or her part during risk communication efforts.

Partnerships may not cost more than the time involved to set up and maintain them. However, some partners may expect compensation for their involvement. When partners provide staff augmentation, the organization may be expected to provide space, supplies, and equipment for partner staff to work.

Little technical knowledge is required to engage in a partnership. In fact, partners may be the ones providing the subject matter expertise in the risk or the communication. More important is the ability to work collaboratively, working out differences, so that each partner gains something from the association.

For more information on working in partnership, see Chapter 20.

CHECKLIST FOR DETERMINING APPROPRIATE METHODS

If the purpose of the risk communication effort was:

- ☐ To increase the audience's awareness of the risk, the methods considered included:
  - ☐ Visual representation of risk
  - ☐ Face-to-face communication
  - ☐ Technology-assisted communication
  - ☐ Partnerships
- ☐ To inform the audience, the methods considered included:
  - ☐ Information materials
  - ☐ Face-to-face communication
  - ☐ Technology-assisted communication
  - ☐ Social media
  - ☐ Partnerships
- ☐ To build consensus between the audience and the organization assessing or managing the risk, the methods considered included:
  - ☐ Stakeholder participation
  - ☐ Social media
  - ☐ Partnerships

- ☐ To change behavior for the risk, the methods considered included:
  - ☐ Information materials
  - ☐ Face-to-face communication
  - ☐ Visual representation of risk
  - ☐ Social media
  - ☐ Partnerships

ADDITIONAL RESOURCES

Sachsman, D. B., M. R. Greenberg, and P. M. Sandman, eds. 1988. *Environmental Reporter's Handbook*. Rutgers University, Cook College, Environmental Communication Research Program, New Jersey Agricultural Experiment Station, New Brunswick, New Jersey.

Sandman, P. M., D. B. Sachsman, and M. R. Greenberg. 1988. *The Environmental News Source: Providing Environmental Risk Information to the Media*. New Jersey Institute of Technology, Hazardous Substance Management Research Center, Risk Communication Project, Newark, New Jersey.

Santos, S. L. 1990. "Developing a Risk Communication Strategy." *Management and Operations*, November: 45–49.

11

SET A SCHEDULE

Once you know what you hope to accomplish, who you are doing it for, and how you will do it, you need to determine when you will do it. Setting a schedule for risk communication efforts requires that you consider a number of factors, such as legal requirements, organizational requirements, the scientific process, other ongoing activities, and audience needs.

LEGAL REQUIREMENTS

Legal considerations are usually the first item that must be considered if the organization conducting the risk communication effort is to avoid litigation. As discussed in Chapter 3, many risk communication efforts are the result of laws, which usually prescribe schedules as well. One of the better delineated schedules can be found in the Superfund

> Legal considerations are usually the first item that must be considered if the organization conducting the risk communication effort is to avoid litigation.

Risk Communication: A Handbook for Communicating Environmental, Safety, and Health Risks, Sixth Edition. Regina E. Lundgren and Andrea H. McMakin.
© 2018 The Institute of Electrical and Electronics Engineers, Inc., and Regina E. Lundgren and Andrea H. McMakin. Published 2018 by John Wiley & Sons, Inc.

laws and associated advice from the U.S. Environmental Protection Agency (see Figure 3.1 in Chapter 3; EPA 1992).

Federal, state, and local laws and regulations may specify schedules for risk communication milestones. Consult your legal department, a law firm, or a local risk-related government agency to determine which legal requirements apply in your case.

ORGANIZATIONAL REQUIREMENTS

After legal requirements have been determined, consider the requirements of your organization. What kinds of reviews will be necessary for any risk communication message to be sent? How long will each review take? Make a calendar for yourself so that you can follow your way through these requirements and plan for them. Look for requirements such as the following:

- **Scientific review.** To verify that the information about the risk is correct and the most current available
- **Editorial review.** To make sure that the way the information is presented will be understood by the audience
- **Management review.** To make sure that the information being presented is what the organization wants to present
- **Sensitivity review.** To make sure that the information being presented does not compromise national security or business interests
- **Legal review.** To make sure that the information does not compromise the organization relative to a law with which the organization must comply
- **Patents review.** To make sure that the information being presented does not give away intellectual property and make it difficult for the organization to patent a certain idea or device
- **Public affairs review.** To make sure that the information will not embarrass the organization

The purpose and objectives of your risk communication efforts also affect the schedule. What frequency or duration is needed to achieve this purpose? If your purpose is to raise awareness, a short-term burst of activity that focuses on several methods would provide the most visibility. If your purpose is to build consensus so that your audience and the organization analyzing or managing the risk can come to a decision, you may want to conduct the activities over a longer time, providing different information as it is needed in the consensus-building process.

> The purpose and objectives of your risk communication efforts also affect the schedule.

THE SCIENTIFIC PROCESS

Your communication efforts will most likely have to coincide with certain aspects of the scientific process. Once a risk has been identified, you must alert those at risk, then follow up with more information as the assessment continues. While those who are assessing the risk may not be able to give you exact dates when they will know certain information, they should have a schedule showing what steps will take place. Make sure that you are aware of that schedule and any changes to it as you plan (and update) your risk communication schedule.

Your communication efforts will most likely have to coincide with certain aspects of the scientific process. Once a risk has been identified, you must alert those at risk, then follow up with more information as the assessment continues.

ONGOING ACTIVITIES

The next item to consider is what else is going on within your organization, the community, and the nation, so that you can put your risk communication efforts in context. What other kinds of information will be released from your organization at the same time you are planning to release your risk communication information? For example, if the organization plans to announce the results of a 10-year study on cancer-causing chemicals, you may want to delay releasing your information about one of the chemicals so that you can incorporate the latest data. On the other hand, if the results of the 10-year study confirm your information on risk, you may want to bring your message out first and use the study as reinforcement.

What will be happening in the community during your risk communication efforts? In one case, we were trying to determine when to hold the first public meeting near a Superfund site in central Alaska. We hoped for a certain week in October, only to find that that week was part of moose-hunting season, an extremely popular event for the community. So, even though we did not want to wait to release information, we tried for another time to meet the needs of our audience and to make our efforts more effective.

What will be happening in the nation during your communication efforts? This is much harder to predict. However, if your organization is dependent on federal funding, and an election in which your funding is an issue is imminent, you should wait until after the election to promise funds to a citizens group to act as advisors in your risk assessment, management, and communication activities. Although other national trends are harder to foresee, try to at least determine your organization's agenda for the next few months at the national level.

AUDIENCE NEEDS

To determine audience needs, consider the information from your audience analysis and the timing and severity of the risk. If you are in a crisis situation, obviously, the audience needs as much pertinent information as possible as soon as possible. They need straightforward answers to such questions as follows:

> To determine audience needs, consider the information from your audience analysis and the timing and severity of the risk.

- What happened?
- How dangerous is it?
- How could it affect me or people or things I care about?
- What can I do?

If the risk is a longer-term one, such as those related to the cleanup of a hazardous waste site, your schedule will be longer and more complex. You will need to answer the same types of questions, but with more detail and in a variety of ways. The answers are likely to change over time as more information becomes available, so you will need to continue to issue messages. (This happens during a crisis as well, but on a much smaller scale and in a compressed time frame.) See Chapter 9 on more on the kinds of information audiences need to make an informed decision about risks in care, consensus, and crisis communications.

What your audience knows about the risk can also affect your schedule. An audience first needs to be aware of a risk and its relevancy to them before being willing to take any action associated with the risk. Many theories have been proposed as to the process by which people at risk take in information about the risk and decide to act (for example, by moving to more healthy behaviors, partnering with others to develop a more effective risk management approach, or taking immediate protective actions for care, consensus, and crisis communications, respectively). Earlier versions of this risk communication handbook described decision processes that have since been overcome by newer models, and those models are likely to be overcome again before the next edition.

For risk communicators, one of the important considerations is that the audience's process of choosing to take some action about a risk may take minutes to years, depending on the individual and the circumstances. For care communication, the process can take weeks to months, unless the health or safety issue becomes more obviously urgent to the audience. For consensus communication, the process can take months to years as audience members learn more about the situation and become comfortable interacting with other stakeholders. For crisis communication, it can take as little as a few minutes to make the decision to evacuate, particularly when audiences have been involved with emergency planning efforts. For less aware and less involved members of the audience, or members of the audience who choose to ignore risk management advice for ethical or religious reasons, actions may be taken too late or not at all.

The other important consideration is that the audience's information needs and the methods of meeting those needs change as audience members move along the continuum from awareness to action. Visual representations, face-to-face communication, information in the news media, and engagement on social media in short, concentrated bursts can help raise awareness. Face-to-face communication, social media, stakeholder participation, and partnerships can increase trust in the organization and confidence in the risk assessment. Information materials and technology-assisted communication along with additional engagement of the audience through stakeholder participation or social media can share more information as audiences begin to look for choices in managing the risk.

To determine where your audience sits along the decision spectrum, conduct thorough audience analysis, pretest risk messages, or otherwise consult with audience representatives.

CHECKLIST FOR SETTING SCHEDULES

The schedule is based on the following:

- ☐ Legal requirements associated with the risk communication effort
- ☐ Number and timing of organizational reviews
- ☐ Purpose of the risk communication effort
- ☐ Objectives of the risk communication effort
- ☐ Schedule of the risk assessment
- ☐ Activities within the organization
- ☐ Activities within the community
- ☐ Activities within the nation
- ☐ Audience's point in the decision process
- ☐ If the purpose of the risk communication effort is to increase awareness, the schedule is based on a concentrated burst of information, factoring in other constraints and audience needs.
- ☐ If the purpose of the risk communication effort is to inform the audience or change behavior, the schedule allows for the following:
  - ☐ Introduction of the risk
  - ☐ Additional information given over time

If the purpose of the risk communication effort is to build consensus, the schedule allows for the dissemination of risk information in support of the consensus-building process:

☐ Before activities
☐ During activities
☐ After activities

REFERENCE

EPA (U.S. Environmental Protection Agency). 1992. *Community Relations in Superfund: A Handbook*, EPA/540/G-88/002. U.S. Environmental Protection Agency, Office of Emergency and Remedial Response, Washington, DC.

12

DEVELOP A COMMUNICATION PLAN

Now that you have determined your purpose and objectives, analyzed your audience, developed your messages, chosen your methods, and set your schedule, you need to put them all together into a comprehensive plan. Why not just keep the information in your head, notes on your desk, or a file in your computer? There are several reasons:

> Information management and communication should be part of planned design and execution, and be integral to an organization's risk and disaster management plans. Improvised communication can be costly and have unsatisfactory results.
> —S.A. Barrantes et al. (2009, p. 8)

- A written plan is less likely to be lost than miscellaneous notes or files.
- At some point in the risk communication process, someone either inside or outside the organization may challenge your methods or approach. Having a comprehensive plan is a good defense.
- Having a formal plan that has been accepted (through signatures if

---

Risk Communication: A Handbook for Communicating Environmental, Safety, and Health Risks,
Sixth Edition. Regina E. Lundgren and Andrea H. McMakin.
© 2018 The Institute of Electrical and Electronics Engineers, Inc., and Regina E. Lundgren
and Andrea H. McMakin. Published 2018 by John Wiley & Sons, Inc.

necessary) by management can be handy in setting priorities and in getting timely approvals for specific activities.

- Because formal plans are more organized, easier to review, and imply a more formal effort, the work they describe is more likely to receive the necessary funding and resources than those in nebulous plans.
- It is easier to evaluate the results of formal plans because you can relate results directly back to your purpose and objectives, schedule, and audience.

In addition, studies show that having a risk communication plan well integrated with the risk assessment effort can save time and money as well as increase the success of the risk assessment and management process (Barrantes et al. 2009). The elements to include in a communication plan and how to bring all the elements together are discussed in the remainder of this chapter.

WHAT TO INCLUDE IN A COMMUNICATION PLAN

A variety of information contributes to a comprehensive communication plan, as shown in the outline in Figure 12.1. You may also want to include other elements, depending on your organization's requirements and the type of risk communication (care, consensus, or crisis). For example, Michelle Obama's 2010 Let's Move campaign to combat childhood obesity included political, social, and public health components along with the roles of partners from businesses, associations, and federal agencies at the local, regional, and national levels (Gillam 2012).

A community engagement plan, on the other hand, could include information on specific locations to hold meetings and how to arrange logistics. The Churchill County Leukemia Cluster risk communication plan warned communicators to avoid bringing bottled water into the community because residents were fearful local water supplies were to blame for the hazard and seeing those in authority apparently refusing to drink the water would only have fueled the fear.

Examples from crisis and emergency risk communication abound. The North Country Public Health Network in New Hampshire included a public information and warning section into the Public Health Emergency Annex. The section included an introduction with purpose, scope, assumptions, goals, and public information officer contacts at the state and regional levels. Other sections covered crisis and risk communication principles that drove the plan, pre-event planning, regional responsibilities, and methods of communication, with information about reaching special populations and media monitoring and rumor control. The West Virginia University Emergency Risk Communication Plan includes examples of messages that could be sent via the campus emergency alert system for various types of threats such as fires or an active shooter. See Chapter 22 for specific aspects needed in communication plans related to emergency response.

- Introduction
  - Purpose of the plan
  - Scope of the plan
  - Background on the risk
    - What is the risk?
    - Who is affected by it?
  - Authority
    - Under what authority (law or organizational mandate) is the risk being communicated?
  - Purpose of the risk communication effort
  - Specific objectives
- Audience Profile
  - How audience information was gathered
  - Key audience characteristics
- Risk Communication Strategies
- Evaluation Strategies
- Schedule and Resources
  - Detailed schedule that identifies tasks and people responsible for completing them
  - Estimated budget
  - Other resources to be used (equipment, meeting rooms, etc.)
- Internal Communication
  - How progress will be documented
  - Approvals needed/received
- Sign-off Page
  - Names, job titles, and signatures of key staff acknowledging that they have read and concur with the plan

Figure 12.1. Outline of a risk communication plan.

In general, the introduction of the plan should discuss why you are writing the plan (purpose), what kinds of activities are covered by the plan (scope), background material on the risk being communicated, the reason your organization is communicating about the risk (authority), and the purpose and objectives of your effort (see Chapter 7 for more information on setting these). In addition, be sure to note any policies that your organization may have on risk communication or information dissemination. This information leads to the next section on audience.

The audience profile section describes what you know about the audience and how you learned it (see Chapter 8). The audience profile section can also discuss how segments of the audience differ. For example, in a care communication effort in which you are informing a community about the potential of fecal coliform bacteria in their well water, the audience might be segmented by level of risk: those who have wells with high readings of the bacteria, those who have wells with minimum readings, those who have wells free of the bacteria, and other interested community members. Each of these groups could differ in the kinds of information they need to make informed decisions regarding their risk. In a consensus

The introduction of the plan should discuss why you are writing the plan, what kinds of activities are covered by the plan, background material on the risk being communicated, the reason your organization is communicating about the risk, and the purpose and objectives of your effort.

communication effort, audiences might be segmented by the amount of involvement they desire in the decision-making process. Each of these groups could differ in the risk communication method used. In other cases, audiences might be segmented by comprehension level (for example, uneducated to highly educated), geographic distribution (for example, those who can come to local public meetings and those outside the local area), or method accessibility (Internet access, comfort dealing with computers). In these cases, the difference between the audience segments is not so much the kind of information, but the way in which it is delivered. This section of the plan notes such key differences that will affect the risk communication effort described in the following section.

Risk communication strategies take what you learned about the audience and your purpose and objectives, and lay out the methods you will use to reach each of the segments of your audience (see Chapter 10 for more information on methods). These strategies are closely aligned with the evaluation strategies (see Chapter 21 for additional information).

The schedule and resources section describes what you need to implement the strategies you laid out and how long it will take to fully implement them. Make sure you include resources other than funding. For example, if you are conducting a consensus communication effort, you might need space for the group to meet, audiovisual equipment to make presentations, and clerical support to create meeting minutes, among other resources. For additional information on setting a schedule, see Chapter 11.

The internal communication section describes how your organization will be kept apprised of the risk communication effort. Will you share monthly reports or emails at key points, maintain an online project management dashboard, or give presentations to interested groups within the organization? Even if your organization does not require you to provide such updates, consider doing so to help ensure that your activities are visible and valued by your colleagues and management. Such visibility can help when additional resources are needed for this effort or future efforts. In addition, factor in what training is needed by staff. Who needs to understand how to interact with the news media? Who has not had risk communication training? Be sure to include this information in the resources section as well.

The last item in the figure, the sign-off page, is particularly important because it confirms organizational support. Get acceptance of the plan (as indicated by the signature) from all those involved in the risk communication effort or having to approve of the risk communication process or materials. Discuss the plan with and get acceptance of it from staff who are conducting the assessment and anyone

The last item in the figure, the sign-off page, is particularly important because it confirms organizational support.

involved with communicating the risk or approving its communication. Get signatures from managers of technical staff conducting the risk assessment, those in charge of making any decision based on the risk assessment results, managers in the public affairs and/or communications departments, and managers of staff involved in the risk communication effort. You want the acceptance of these managers as well as their staff because the managers will have to approve staff time and resources (which their staff may not be able to commit to alone), the managers need to be aware of what their staff is doing, and the managers are likely to be the ones who have to answer questions from the public or outside organizations regarding your efforts and, therefore, need to be informed about them.

Once you have been through the process of gathering information and crafting it into a risk communication plan, it is tempting to cut corners and simply cut and paste from one effort to the next. While organizations that communicate with the same audience about the same risk over time may be able to reuse portions of the plan, always review the information before recycling it into another plan. Audiences, messages, and methods change over time, as does the organization communicating about the risk. Using outdated information can at a minimum hinder effective communication and could significantly decrease audience trust in the organization. For example, the BP Regional Oil Spill Response Plan for its work in the Gulf of Mexico failed to specify communication mechanisms in a crisis and included so many errors (such as the need to protect walruses, sea lions, and seals, none of which is found in the Gulf) that it was embarrassing when it was released to the public following the Deep-Water Horizon oil spill (Galloway and Kwansah-Aidoo 2012).

DEVELOPING RISK COMMUNICATION STRATEGIES

A number of methods can be used to plan complex projects. Four of the most useful methods in planning a risk communication effort are using storyboarding, following the guidelines recommended by the U.S. Environmental Protection Agency (EPA) for Community Relations Plans under Superfund, using an audience focus, and using a technique that combines the elements of strategic planning and public involvement.

Four useful methods in planning a risk communication effort are using storyboarding, following the guidelines recommended by the U.S. Environmental Protection Agency (EPA) for Community Relations Plans under Superfund, using an audience focus, and using a technique that combines the elements of strategic planning and public involvement.

Storyboarding as a Planning Tool

Storyboarding is a technique that has been applied to organizing the content of a variety of communication products. It can also be used to develop the entire communication effort. This technique is most useful in planning care or consensus communication efforts and probably cannot be used in crisis communication because it takes time and requires a team of staff to work together, which may be difficult to accommodate in some schedules.

A storyboard can be any large flat surface to which pieces of paper can be affixed with tape, nonpermanent adhesive, pins, or tacks. Or, you can use storyboarding software, or a general-purpose software that is easy to modify in real time. The process starts with all those involved (those who are communicating the risk as well as other technical experts, managers, support staff, and even members of the audience, if you can arrange it) brainstorming ideas. Someone not involved in the risk communication effort should facilitate the session. The ideas can relate to any part of the process: audience, particular messages, or how to distribute them. The facilitator should let the ideas flow and not censor them, even if they are impractical or impossible. The facilitator or participants write each idea on a separate piece of paper and affix it to the board (or the facilitator can capture the ideas from the participants using software that is projected in a way everyone can see).

When the group runs out of ideas, the facilitator helps them begin to organize the ideas into the elements discussed in the outline in Figure 12.1. Use larger or different colored cards (or software) to indicate categories. The facilitator will move the ideas into the categories, encouraging discussion. From the discussion, the group can begin to weed out infeasible or contradictory ideas.

Once the ideas have been categorized, the facilitator works with the group to organize the ideas within each category. The ideas can be put in any order that makes sense for your situation. For example, if one category was audience information, you could organize it by various segments of the audience. You now have a detailed list of strategies to be covered in the plan and to be used in your risk communication effort.

Case Study: Food Safety Response Lacks Effective Strategy

This is the story of one of the most widely covered food safety crises in U.S. history—and the crisis communication effort that the company seemed unprepared for.

Between July 2015 and April 2017, the restaurant chain Chipotle Mexican Grill suffered a number of serious food safety outbreaks. *Norovirus*, *Escherichia coli*, and *Salmonella* from its foods sickened hundreds of customers in about a dozen states (Goldman 2017). This hit to the firm's reputation resulted in a dip in market capitalization, compounded when the U.S. Food and Drug Administration opened a criminal investigation into the outbreaks.

Company officials did not explain quickly enough the steps it was taking to correct the issue. Though Chipotle had been known for highly engaged, personalized social media responses, it took at least 2 weeks for the company to respond to inquiries and comments on Twitter, and in the meantime, angry comments on Facebook went unanswered.

Communication consultant Nick Kalm stated that the restaurant should have quickly posted a statement on its website, issued a press release, and put statements on social media (Bradley 2015). Messaging should have focused on reassuring customers that there were no issues at other locations, particularly in states neighboring the areas where the restaurants were closed, Kalm said.

On the plus side, Chipotle closed all of its stores for a half day for its employees and reporters to hold a virtual meeting with CEO Steve Ellis about changes that would be rolled out at all stores. Ellis then made an appearance on the *Today* show on NBC apologizing and saying Chipotle would become the "safest place to eat." The apology was a good move, but the promise may have been overhyped for a 2000+ unit chain.

One questionable communication tactic was "A Love Story," an animated film that the company released in 2016 in the midst of the food safety issues. The film featured food entrepreneurs gradually "selling out" as they grew bigger, until they realized the disastrous consequences and reverted to their high-quality food offerings. Critics called it a defensive attack on Chipotle's competitors. The ad's timing was also awkward, coming after a top Chipotle marketing executive was indicted on drug charges.

The bottom line: Have a risk communication plan in place that prepares the organization for responding to a crisis—and then implement it, adapting it as circumstances change.

Communication Planning Using the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Approach

The EPA's (1992) publication, *Community Relations in Superfund: A Handbook* (originally published in 1992 and updated since with a number of tools and examples), is an invaluable resource for developing community relations plans (and communication plans) that meet the requirements of the CERCLA or Superfund. This publication lists elements that should be included (these elements look much like the outline in Figure 12.1) and gives an example of a community relations plan. While the method described in the publication is most applicable to planning a risk communication effort related to CERCLA, it can also be used to plan care, consensus, and crisis communication.

In general, communication planning under CERCLA requires that those who are responsible for cleaning up a Superfund site interview members of the public and organizations who might be interested in or are affected by the cleanup.

In general, communication planning under CERCLA requires that those who are responsible for cleaning up a Superfund site (or conducting the care, consensus, or crisis communication) interview members of the public and organizations who might be interested in or are affected by the cleanup (or the risk being communicated). Much the same information is gathered as during audience analysis, and it is used to plan appropriate strategies for communicating risk information. The number of interviews needed depends on the number of people who may be interested or affected. (For crisis communication, this method is best used in planning a crisis response rather than during the actual crisis.)

A more in-depth approach similar to this one is to develop a "mental model" of how the audience and experts view the risk and then focus on reinforcing appropriate messages and on correcting misperceptions. This approach is particularly useful for care communication. More information on this approach can be found in Chapters 2 and 9.

Using an Audience Focus

Another technique to identify strategies is to focus on the needs of various segments of your audience. This can be accomplished in several ways. James Creighton, public participation expert and consultant responsible for many of the Bonneville Power Administration's successes in risk communication, uses an "onion diagram" (Figure 12.2). The center of the onion represents the risk, and each of the rings represents audience segments. In care and crisis communication, the audiences closest to the center are those most at risk. In consensus communication (as in the example in Figure 12.2), the audiences closest to the center are those who want to be the most heavily involved in making the decision.

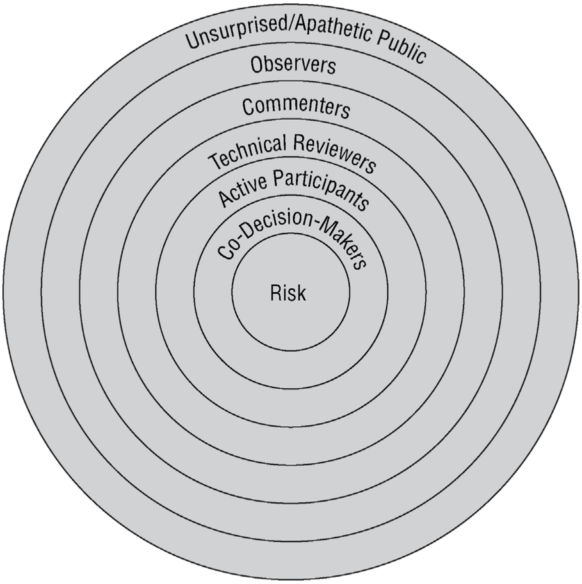


Figure 12.2. Audience-centered technique for communication planning. (Adapted from various works by James Creighton.)

For any risk communication effort, a slightly different set of specific audiences will be in each of the rings. For example, in a consensus communication effort in which citizens of the Pacific Northwest would be asked to determine potential ways to mitigate risks to the salmon population:

1. The innermost circle would include the agency charged with making the decision and most likely the Native American tribes who rely on the fish for subsistence, economic development, and ceremonial purposes, but who must be consulted under a government-to-government agreement (co-decision-makers).
2. The next circle (active participants) would include others with economic interests (other commercial fishers or those in the tourist industry) and environmental groups.
3. The next circle (technical reviewers) would include other related regulatory agencies.
4. The next circle (commenters) would include interested residents of communities along the rivers.
5. The next circle (observers) would include the rest of the residents of the Pacific Northwest.

Each of these audience segments will want a different type of involvement.

In general, as you move inward through the rings, the more communication effort is expended. Using the example described earlier, the residents of the Pacific Northwest (observers) would probably be satisfied to read information in the news media about the ongoing activities. If something they read increases concerns, those who are most concerned will join the audience in the next ring. The residents of river communities will probably want additional information, such as direct-mail pamphlets and presentations to local organizations, whereas those with economic or environmental interests will want more direct involvement in making the decision, such as participating in workshops or on advisory committees. The Native American tribes will expect to be consulted and to actively help make the decision.

Another way to plan for audience needs is to use a situational assessment. According to researchers David Dozier and James and Larissa Grunig, who studied excellence in public relations and communications organizations (Dozier et al. 1995), audiences can be segmented into the following groups (adapted for use in risk communication) based on their situation in relation to the risk and the organization communicating about the risk:

- **Nonpublic.** Those members of the audience who are not affected by the risk or the organization communicating the risk and vice versa
- **Latent public.** Audiences affected by the risk but do not realize it

- **Aware public.** Audiences both affected by the risk and knowledgeable of the fact
- **Active public.** Audiences organized to do something about the risk

Ignoring any segment of the audience can have serious consequences.

Dozier and his colleagues warn that organizations often focus communication efforts solely on the last group. By the time ignored members become active, their views are often negative, entrenched, and oppositional. Although each segment of the audience may be reached using different methods and schedules, it is better to cultivate all segments early in the risk communication process.

Another way to view audiences is by what causes them to be interested in the risk. One crisis communication manual developed for the state of California by a team of experts, including risk communication luminary Peter Sandman (OES 2001), divides audiences into the following segments:

- **Residential community.** People living near the risk, who have a personal or familial interest in health, safety, the environment, or quality of life in the area
- **Business/commercial community.** Businesses that may be affected by the risk, who are concerned about loss of revenue, infrastructure availability, and protection of employees, as well as personal safety
- **Industrial community.** Businesses that could be affected and who could affect the risk (for example, chemical tanks being targeted by terrorists), who are concerned with the same things as other businesses, as well as security issues
- **Your organization.** The staff and management who are charged with analyzing, managing, and/or communicating risk, who need to understand the effort as well as the risk
- **Other organizations.** The staff and management of organizations teaming with you in analyzing, managing, and/or communicating about the risk, who need to be able to explain and implement their roles

The types of information and communication mechanisms may differ for each of these groups as well.

Using one of these three audience-focused approaches for your risk communication effort can help ensure that all segments of the audience are considered in planning and implementation.

Strategic Planning for Risk Communication

Social scientists at Battelle developed a method that combines elements of strategic planning with the ideals of public involvement to create plans for a variety of efforts, including risk communication. Strategic planning identifies an organization's strengths and weaknesses, opportunities to reach goals, and threats to those opportunities. Public involvement is incorporated by interviewing people who are interested in or affected by an organization to learn whether they view the organization in the same way as the organization views itself. This method is most useful in planning care communication efforts but can also be used in planning for a response to a crisis.

To use this method, start by identifying the values of your organization. What does your organization believe in, what is its mission, what is its purpose for being? Then state what the organization hopes to accomplish and how you will know when it has been accomplished. Next, list the purposes and objectives of your risk communication effort. Looking at these and the information you developed in the previous steps, you can begin a situational analysis. What is the current situation? What assumptions did you make when planning for it? What are the strengths and weaknesses of your organization? What opportunities are available to you as you try to communicate risk? Is there anything that could prevent you from taking those opportunities? Who is your audience? What are the key issues?

From this analysis, your strategies for risk communication should start to emerge. Discuss your strategies and the information you have developed in the previous steps with representative members of your audience. Do they see the organization in the same way you did? Do they agree with your strategies for communicating risk? What suggestions can they offer to make your program stronger? Incorporate these suggestions into a final plan, using the outline in Figure 12.1.

CHECKLIST FOR DEVELOPING A COMMUNICATION PLAN

- ☐ The plan includes the elements outlined in Figure 12.1.
- ☐ All segments of the audience have been considered in planning.
- ☐ The plan has been agreed to by
  - ☐ those who are communicating the risk
  - ☐ those who are assessing the risk
  - ☐ those who are managing the risk
- ☐ The plan has received the signatures of the
  - ☐ managers of those who are communicating the risk
  - ☐ managers of those who are assessing the risk
  - ☐ managers of those who are managing the risk

REFERENCES

Barrantes, S. A., M. Rodriguez, and R. Pérez. 2009. *Information Management and Communication in Emergencies and Disasters*. Pan American Health Organization, Regional Office of the World Health Organization, Washington, DC.

Bradley, D. 2015. “Chipotle Doesn’t Have Much to Say about E. Coli Outbreak.” PR Week, November 2, 2015. https://www.prweek.com/article/1371039/chipotle-doesnt-say-e-coli-outbreak (accessed January 29, 2018).

Dozier, D. M., L. A. Grunig, and J. E. Grunig. 1995. *Managers Guide to Excellence in Public Relations and Communication Management*. Lawrence Erlbaum Associates, Mahwah, New Jersey.

EPA (U.S., Environmental Protection Agency). 1992. *Community Relations in Superfund: A Handbook*, EPAJ540/G-88/002. U.S. Environmental Protection Agency, Office of Emergency and Remedial Response, Washington, DC.

Galloway, C. and K. Kwansah-Aidoo. 2012. “Victoria Burning: Confronting the 2009 Catastrophic Bushfires in Australia.” In A. M. George and C. B. Pratt, eds., *Case Studies in Crisis Communication: International Perspectives on Hits and Misses*. Routlege, New York, pp. 279–282.

Gillam, S.L. 2012. “On Target: Minority Outreach Strategies of the Let’s Move! Campaign.” Master’s thesis submitted to the School of Journalism and Mass Communication, University of North Carolina at Chapel Hill. https://cdr.lib.unc.edu/indexablecontent/uuid:4f86bca3-e3fd-42de-80c0-a50af97bbfac (accessed September 12, 2017).

Goldman, D. 2017. “Chipotle Says Sick Employee Responsible for Latest Outbreak.” CNN Money. http://money.cnn.com/2017/07/26/news/companies/chipotle-sick/index.html (accessed January 29, 2018).

OES (Governor’s Office of Emergency Services). 2001. *Risk Communication Guide for State and Local Agencies*. Office of Emergency Services, Sacramento, California.

ADDITIONAL RESOURCES

McCallum, D. B. 1995. “Risk Communication: A Tool for Behavior Change.” *NIDA Research Monograph*, 155: 65–89.

Shyette, B. and S. Pastor. 1989. “Community Assessment: A Planned Approach to Addressing Health and Environmental Concerns.” In *Superfund ‘89: Proceedings of the 10th National Conference*. Hazardous Materials Control Research Institute, Washington, DC pp. 635–641.

III

PUTTING RISK COMMUNICATION INTO ACTION

Each method (information materials, visual representation, face-to-face communication, news media, stakeholder participation, technology-assisted communication, social media, or partnerships) has its own idiosyncrasies when used as a method for risk communication. Knowing these differences can help make the risk communication process more effective.

> The farther away we get from individual contact, the more room there is for confusion and misunderstanding.
> —Thomas Wilson (1989, p. 78)

Risk Communication: A Handbook for Communicating Environmental, Safety, and Health Risks, Sixth Edition. Regina E. Lundgren and Andrea H. McMakin.

© 2018 The Institute of Electrical and Electronics Engineers, Inc., and Regina E. Lundgren and Andrea H. McMakin. Published 2018 by John Wiley & Sons, Inc.

13

INFORMATION MATERIALS

The written message in the form of information materials has long been a staple of the communication world. The advantages and disadvantages of using information materials are discussed in Chapter 10. There are a number of ways to communicate risk via information materials, including newsletters; pamphlets, booklets, and fact sheets; posters, advertisements, and displays; articles in professional or trade journals, popular press magazines, blogs, and newspapers; and technical reports and books. Specific advice on each of these types of information materials is provided later in this chapter, focusing on how these materials differ from those used in other types of communication efforts. First, however, here are some principles for constructing information materials.

CONSTRUCTING INFORMATION MATERIALS

Whatever the form of the information material, those who are communicating risk must consider what information to include, how to organize messages, appropriate language, and the use of the narrative style.

Risk Communication: A Handbook for Communicating Environmental, Safety, and Health Risks,
Sixth Edition. Regina E. Lundgren and Andrea H. McMakin.
© 2018 The Institute of Electrical and Electronics Engineers, Inc., and Regina E. Lundgren
and Andrea H. McMakin. Published 2018 by John Wiley & Sons, Inc.

Information to Be Included

For information materials, a number of techniques can be used to present content in a way that your audience will understand. Remember, however, that the primary rule is to know your audience. Take or leave the other rules as they fit your audience's needs and situation. Figure 13.1 lists the kinds of information that might be included in information materials. The following list describes this information in more detail. Depending on the length and scope of the information material (for example, an advertisement versus a technical report), these elements may be a single word or symbol or represent entire sections or chapters:

- For materials over two pages long (one page on a web screen), summarize the **goals and content** of the information material. What is the purpose of this communication? What does it contain? This information is particularly important when you are using a variety of methods because it allows the audience to choose the risk communication message that best meets their needs. For example, if a member of the audience wants information on methods for testing a home for radon, and your pamphlet states that it describes what radon is and why the audience should test for it, the audience member will know to look elsewhere for the information on testing. Information on goals and content also helps guide readers through the risk information.
- Describe the **nature of the risk and what the risk entails**. What is the risk? Who is at risk? Put the risk in context. For example, is the risk similar to other risks with which the audience is more familiar? See Chapter 6 for more information on comparing risks.

- Goals and content of the information material
- Nature of the risk
- Alternatives to the action that is causing the risk and any risks associated with these alternatives
- Uncertainties in the risk assessment
- How the risk will be managed
- Benefits of the risk
- Actions that the audience can take to mitigate or manage exposure to the risk
- Contact point
- Glossary
- Conversion table
- "Helpful hints"
- Index
- List of related information

Figure 13.1. Information to include in written risk communication messages.

- Discuss **alternatives to the action that is causing the risk** and any risks associated with these alternatives. For care communication, what alternatives does the audience have to living with the risk? Are there any risks associated with those alternatives? For consensus communication, what alternatives are being evaluated in making a decision? What criteria are being used to evaluate the alternatives? For crisis communication, alternatives focus on different actions that can be taken to mitigate the risk.
- Discuss **uncertainties in the risk assessment**. How were the data collected? How were they analyzed? See Chapter 6 for more information on uncertainties. See Chapter 14 for ways to portray uncertainties visually.
- Explain **how the risk will be managed**. Risks are managed differently in care, consensus, and crisis communication. For care communication, it is usually the audience who must manage the risk, for example, by following safety procedures (although government agencies may be charged with monitoring a public health risk). For consensus communication, the audience and the organization charged with making a decision about the risk work to build consensus on how the risk will be managed, for example, by agreeing to operate a network of measurement devices around a hazardous waste site to monitor releases. For crisis communication, local, state, and federal agencies as well as individuals and organizations may be involved in managing the crisis situation.
- Describe any **benefits of the risk**. Will anything good result from people being exposed to this risk? For example, hormone therapy in postmenopausal woman helps maintain bone density and regulates hormonal systems but may contribute to greater chances of breast and uterine cancer. Be very leery of how you use this information. If the benefits are all to one group or the nebulous "science" or "humankind," and the risks are all to another group, the group at risk may not care how much their risks benefit others. Let your audience's desire to know this information be your guide in deciding whether to include it in an information material. See Chapter 9 for more information on the use of benefits in risk communication.
- Present **actions your audience can take to mitigate or manage exposure to the risk**. Can they change their behavior? Can they write to Congress? Can they provide comments on the material? Can they be involved in the risk assessment or risk management process? Knowing what they can do empowers your audience. The less they feel like victims, the less hostility you will have to combat.
- Always include the **name, phone number or e-mail address, and physical address** of someone to contact directly. If you cannot provide a personal contact, a hotline or website will sometimes suffice. List the same contact in all your risk communication materials because the audience will feel more comfortable knowing that there is one reliable source available to answer

Always include the name, phone number or e-mail address, and physical address of someone to contact directly. If you cannot provide a personal contact, a hotline or website will sometimes suffice.

their questions. If you include a phone number, make sure that number is answered 24 hours every day, either by a person or by an answering system. Answering only during business hours is not enough because many people do not have access to a phone on which they would be comfortable making personal calls during that time. In addition, especially for care and crisis communication, it can be potentially life threatening for someone to wait for an answer to a question.

- For anything more than 20 pages long in hard copy, and even fewer pages online, include a **glossary** (with definitions of all necessary abbreviations, acronyms, and technical terms). (For those fewer than 20 pages, avoid acronyms and abbreviations and define technical terms in the text.) In general, for any risk communication message, avoid acronyms and abbreviations. The exceptions are terms that are commonly used more frequently as acronyms than as the spelled-out versions (for example, many people readily identify NASA, but they have to think about National Aeronautics and Space Administration) and phrases used several times per page. When in doubt, spell it out.
- Include a **method to convert metric units**. Although many schools are teaching the metric standard, many adults not directly involved in scientific pursuits are still uncomfortable with metric units. However, some federal agencies require that the primary units used in their information materials be metric. If you have only a few measurements, use analogies or metric units with other units in parentheses. If doing this conversion repeatedly will severely disrupt your text, use metric units and include a conversion table in your glossary.
- In information materials that cannot avoid being technical, include a section of **"helpful hints"** that explains things like scientific notation, uncertainties in tables and graphs, use of "less than" and "greater than" symbols, and other technical conventions. Readers who have a high level of technical knowledge can ignore the section while those with a lower level can use it to decipher the information.
- In documents longer than 40 pages, include an **index** so that the readers can find specific information. Most members of your audience have limited time to devote to reading, so anything you can do to help them find the information they want quickly will encourage them to read your information. In general, indexes should contain key words, phrases, and ideas from the text.

- End with a **list of related information**. Telling your audience where to find other sources will help them obtain the exact information they want and will encourage them to learn more about the risk. Point them to both your organization's publications and those prepared by other organizations.

Organizing Content for Information Materials

The way you organize your content will in large part depend on the form of the information material and your audience's needs. Fact sheets and technical reports are necessarily organized differently. However, one point is important for all forms: discuss how the risk was determined before you present extensive data on the risk itself. Provide a summary of results by all means, especially for those readers who want only that information. However, do not jump into information on exposure calculations before you have discussed the process by which that information was developed or you will confuse your readers. Explaining the risk assessment process before the data gives your audience a context for the data and allows them to make a more informed decision regarding the risk. For consensus communication, particularly in cases in which the audience has a high level of skepticism or hostility toward the risk or the organization charged with managing the risk, it is equally important to discuss the process by which the decision will be made. Include information on how the audience has been and will be involved in the decision process.

> The way you organize your content will in large part depend on the form of the information material and your audience's needs.

Language for Information Materials

The language you use depends primarily on your audience. You may have to translate materials to reach all segments of your audience. Studies have shown that non-English speakers in America are often more at risk both at work and in leisure activities because of an inability to understand health and safety warnings in English. For example, a study on fish advisories for Lake Michigan found that whereas 81% of the English-speaking fishers knew about potential chemical contamination in the lake's fish, only 30% of the non-English-speaking fishers had the same knowledge. Joseph McFadden, a consultant specializing in the effects of language and culture on occupational safety and health, warns that translators must know the culture as well as the language. Strict translation of safety terms may miss nuances of particular cultures. For example, the word for safety in Spanish can sometimes be taken as security instead (TrainingOnline 2006).

Reading level, education, feelings concerning the risk, and experience with risks and science in general and with this risk specifically affect the audience's ability to process the message. Some general rules apply to most situations:

- Avoid any kind of language that might give your audience the feeling that they have no control. "Victims" process information less effectively and react with greater hostility. If you are trying to build consensus about the location of a hazardous waste incinerator, do not say, "The facility will be sited in . . ." when you mean, "The facility would or could be sited in . . . ." If the decision has not yet been made, keep verbs conditional.
- Do not present estimates as facts. Many experts seem to confuse the results of their computer modeling with real life, making statements like "The resulting harm to the affected population was 10 additional deaths from cancer per year." This makes it sound as if 10 people have already died, when, more likely, the information being communicated is an estimate produced by a computer model, given certain assumptions and a range of uncertainties. Give your audience the information to judge what the model results mean.
- Avoid scientific notation, mathematic formulas, and exponents. Although you can explain some of these to a certain extent, just the fact that they are used at all will scare some readers into avoiding your message. It is true that tables of very small and very large numbers quickly become unwieldy if scientific notation (1×10^{-6}) or engineering notation (1E-6) is not used. However, depending on audience perceptions, a table with endless rows of zeroes can make the risk numbers much more obvious and frequently less threatening than a table filled with exponents. Also avoid the convention used in many technical journals of using a superscript −1 to mean "per" ($1\ d^{-1}$ for 1/d or 1 per day). Many members of your audience will find this notation incomprehensible. Instead, use the phrase "one per day."

Avoid scientific notation, mathematic formulas, and exponents. Although you can explain some of these to a certain extent, just the fact that they are used at all will scare some readers into avoiding your message.

- Define how you are using the word "conservative" (or avoid using it) in relation to exposure calculations. Although the scientific community usually uses this term to indicate that the risk was overestimated, common usage, for example, in the finance industry, is to indicate an underestimate ("He's worth, conservatively, $1.5 million"). Therefore, many members of your audience will interpret the term as the opposite of what is intended. Either define the term or use terms like "cautious" or "overestimated" to explain the process.

- Use culture-appropriate terms. Know your audience and what they consider acceptable words. For example, members of the Confederated Tribes and Bands of the Yakama Indian Nation are Native Americans, not Indians. And many tribes do not want to be called stakeholders because they have a government-to-government relationship with state and federal agencies. As in any form of communication, avoid sexist and racist terms.

Some organizations encourage the use of reading levels to gauge the appropriateness of information materials to present a risk message to an audience. Various formulas, such as Dale–Chall, Fry, Flesch Grade Level, Flesch Reading Ease, Fog Index, SMOG, FORCAST, Powers–Somner–Kearl, Spache, and Fleisch–Kincaid, allow the writer to calculate the comprehensibility of text at certain grade levels. Some common software programs enable users to test the readability of their text. Most formulas look at number of syllables or letters per word, number of words per sentence, and number of sentences per paragraph. Others factor in phrases and clauses. As mentioned in Chapter 8, such formulas are not the best indicators of whether material is comprehensible. Pretesting risk messages is usually the better choice.

> Over 250 studies show that health-related print materials are far exceeding the reading ability of the average adult.
> —Green et al. (2007, p. 106)

Case Study: Pretesting Materials with Diverse Stakeholders Pays Off

Pretesting information materials with the intended audience is especially important for care communication that involves potential health effects.

The Office of Pesticides Programs under the U.S. Environmental Protection Agency (EPA) pretested its education materials about pesticide safety in an exercise with farmworkers in 1993. Because the educational materials were expected to reach 3–4 million farmworkers with language and cultural differences, the EPA wanted to find out if the safety messages could be understood.

The risk communication strategy was focused on the literacy level, cultural diversity, and language capabilities of the target audience. First, the teams held focus groups with farmworkers in Florida to learn more about workers' knowledge, perceptions, and concerns about pesticides. Then, they pretested an educational poster and booklet with individual farmworkers.

The farmworkers provided many helpful observations and suggestions for changes in more than 60 graphics and written messages. They suggested things like more realistic farmworker clothing rather than that shown in the booklet, which was more commonly worn by plumbers, mechanics, or construction workers. In the message "Don't Go into Treated Areas," farmworkers indicated that they were more used to an upraised hand, meaning "Don't" versus an "X" or a circle with a slash in it. In an illustration describing first aid for someone who has inhaled pesticides, farmworkers felt that a man loosening the clothing of an ill woman was inappropriate. They suggested showing a woman administering the first aid and clearly showing an undershirt on the ill worker.

The researchers learned several lessons to improve their risk communication efforts, including the following:

- Bring in audience members during the development phase of the materials to advise on word and graphic selections.
- Include stakeholders from ethnicities other than Hispanic, and geographic regions outside Florida, to ensure a better cross section of the farmworker population.
- Assign interview team members who speak the same language as the respondents. Translations from Spanish to English during the interviews led to some difficulty in interpretations.

The most important confirmation, according to EPA environmental protection specialist John Leahy (1994), was that nothing can substitute for going directly to the target audience for validation that a product achieves its goal, or to find out what needs to be changed to make the message more effective.

Narrative Style in Information Materials

One approach to developing information materials is to use the “narrative” style. This style consists of presenting the risk information in the form of a personal story instead of or in addition to presenting exposure calculations or other data. The story structure helps the audience understand the risk by simplifying it and by focusing on cause and effect. International health researcher Dawn Hillier advocates stories as a powerful way to relay health risk information across cultures (Hillier 2006).

Golding et al. (1992) evaluated the narrative style versus what they call “the technical style” in each’s ability to (1) encourage the audience to continue reading, (2) enhance knowledge, and (3) motivate the reader to action. They found that both forms enhanced knowledge equally well but that more readers kept reading the narrative. Unfortunately, neither style was likely to motivate the reader to action. In the case of the narrative style, one possible reason for this lack of motivation is that the audience may not have identified themselves closely enough with the person in the story, pointing to the need to understand your audience before using this technique. George Cvetkovich of Western Washington University, a researcher in the area of public perceptions of risk and public policy, offers some suggestions for optimizing the power of the narrative in risk communication. He advises checking narratives for the following:

- **Involvement.** Is the message interesting to the audience?
- **Relevance.** Does the audience think that the message applies to them?

- **Ability.** Can the audience understand the information being presented and can they act in the way being modeled in the story?

To check narratives for these factors, use audience analysis information to guide you in preparing a prototype message and take the prototype to representative members of your audience for review. Ask them the questions related to involvement, relevance, and ability, and redesign the narrative as necessary to meet their needs.

GUIDELINES FOR SPECIFIC TYPES OF INFORMATION MATERIALS

Information materials can range from the short two-page fact sheet or quarter-page ad in a magazine to the multivolume environmental impact statement. What follows are guidelines for some of the more commonly used types of information materials for communicating risk. For information on creating content for websites, see Chapter 18. For information on creating content for blogs, see Chapter 19.

Newsletters

Newsletters are especially good for long-term projects with a relatively stable audience (stable meaning that the audience consists of mostly the same people throughout the communication process) who are interested in the project/risk being described. They can be mailed or e-mailed to audience members or handed out at other events.

Each issue of a newsletter consists of a series of articles related to a specific risk or type of risk. For example, many Superfund sites send a newsletter to interested members of the communities near the site to keep them informed of the progress of cleanup and the risks entailed. Many health care centers also have newsletters describing healthy lifestyles for their patients. Although the exact content of a newsletter will depend on the audience and the risk, some general rules apply:

Newsletters are especially good for long-term projects with a relatively stable audience (stable meaning that the audience consists of mostly the same people throughout the communication process) who are interested in the project/risk being described.

- When first developing a newsletter, **allow time in your schedule for approvals** from all agencies involved. Because a newsletter often serves as a reflection of the organization over a long period of time as well as a commitment on behalf of the organization, this type of risk communication often requires a number of approvals before the first issue is published, and sometimes for subsequent issues.

- **Develop and maintain mailing lists.** Be sure to include as many members of your audience as possible in your distribution. Include in each issue a method for requesting to be added to or removed from the newsletter distribution, or, for online or e-mailed newsletters, to subscribe and unsubscribe. Maintain an accurate mailing list by updating names and addresses at least quarterly. Some e-mailed newsletters tell their readers that if their e-mail address is “returned undeliverable” for a certain number of times, it will be dropped. Consequently, subscribers are encouraged to notify the newsletter themselves if their e-mail addresses change. If your audience is already hostile, threatening to remove them, spelling names wrong, sending information to the wrong address, or forgetting some members entirely will not help. Many automated systems are available for developing and maintaining e-mail mailing lists.
- **Avoid the use of acronyms and abbreviations.** Like newspapers, newsletters are seldom read straight through from beginning to end. Audience members pick stories and headlines that interest them. They will not know where to look for a definition if they first come across an acronym on page 6 and the acronym was spelled out in some other story on page 3.
- **Encourage people to read by using compelling headlines and graphic elements.** Use design elements appropriately to encourage your audience to keep reading.
- **Be consistent.** One of the advantages of newsletters is that subsequent issues will be sent to the same audience (although one that grows with your mailing list) over time. Use the same words to describe the same place or situation (for example, do not call your environmental cleanup areas source areas in one issue and sites in another). For consensus communication efforts involving a decision process, show readers the process each time with the current stage highlighted. Also, watch the content. If in the first issue you run a story about the new sewer plant opening next April, do not forget to follow up with the grand opening. Lack of consistency can lead to lack of credibility for your entire effort.
- **Follow requirements for e-mail newsletters**. The CAN-SPAM (Controlling the Assault of Non-Solicited Pornography and Marketing) Act of 2003 requires that newsletters sent via e-mail comply with a set of rules. For example, subscribers must be given an easy way to unsubscribe in each issue, the mailing organization must provide a physical address, and headers and subject lines must be clear and consistent as to the e-mail messages purpose. Penalties for violations run more than $40,000 per e-mail. Don’t run the risk of alienating your audience or running afoul of the law.

Pamphlets, Booklets, and Fact Sheets

Pamphlets, booklets, and fact sheets are good for short-term, one-message communication efforts or for covering one aspect of a complex risk. Because they are short, they attract those who are put off by longer information materials. The following are a few points to remember for risk communication messages:

Pamphlets, booklets, and fact sheets are good for short-term, one-message communication efforts or for covering one aspect of a complex risk.

- Focus these short forms to meet specific needs. By their very nature, pamphlets, booklets, and fact sheets have a small amount of space. Cover only one limited subject in each. Your audience's needs will determine the subjects.
- Make these forms self-contained. Pamphlets, booklets, and fact sheets are meant to be picked up, carried away, and read quickly, or reviewed online. Although information on contact points and ways to get additional information should be part of the message, your audience should need nothing more than what they see to understand the point you are trying to make about the risk.
- If the message is part of a series, strive for visual consistency. Try for a "family look" to the publications (similar use of type styles and design) so that your audience will begin to recognize them and, with any luck, become comfortable with them. The higher the comfort level, the more likely your audience will be to read them.
- Distribute these materials where your audience lives. Use a direct mail approach, but do not overlook the power of placing packets in locations where your audience is likely to pick them up and read them. Medical offices, libraries, local businesses, community centers, church vestibules, and even local chambers of commerce are places where your audience may see and pick up such information. Some audiences want to read or download these materials online.

Posters, Advertisements, and Displays

American society is increasingly visually oriented. Posters, advertisements, and displays are a form of information material geared to appeal to this visual orientation. Although the message they can carry will be limited to the space available and the creativity of the designer, these information materials can strongly reinforce key concepts if certain guidelines are followed:

- Any written message should be in the language of the audience. Text should be at the audience's reading level and address audience concerns. The

Posters, advertisements, and displays are a form of information material geared to appeal to the increasingly visual orientation of American society.

message should also be written in a language other than English if the audience speaks English only as a second language. If different members of the audience speak different native languages, similar displays should present the information in each language.

- The message should be simple and clear. This seems obvious, especially given the limited space in display visuals. However, it is frequently violated, sometimes with disastrous results. For example, to advertise its safety campaign, an industrial plant posted a sign outside its gates along the main route for commuters. The sign was covered in text, all in capital letters, and several different colors, with slogans and statistics about lost-workday accidents. Although its placement suggested that it was meant to be read quickly as workers drove home, workers had to slow down to see what it had to say so that the safety sign actually caused accidents. In general, display visuals are meant to be read quickly, so keep them simple.
- All graphic elements should reinforce the risk message. Too many display visuals offer mixed messages. A billboard outside a chemical manufacturing firm warned workers to remember safety as they went to work. The bold, black lettering and sober message spoke of a serious concern; however, the pastel painting of two happy children picking wildflowers that appeared beneath the lettering contradicted the seriousness of the message. A simple, easy-to-remember slogan would have carried more weight.
- Put display visuals where the audience will see them. Where does your audience work and play? Where are they most likely to be exposed to the risk? That is where your messages belong. Putting a message about the dangers of unsafely operating a forklift in the administrative offices may reach a number of people, but not likely the workers who are at risk. Better to put the poster in a place where your audience will be thinking about the risk, such as where the machines are parked.
- Always include sources of additional information. Although display visuals are particularly good at raising audience awareness of a risk, many members of the audience will find the limited message inadequate and want more information. Always be sure to point them in a direction that will reinforce your message. This could be an address, website, or phone number for your organization or a sheet that they can tear off with various contact points. Including this information helps empower your audience to take action.

Articles

If written by someone knowledgeable about the risk who can communicate well, articles in professional or trade journals, popular press magazines, blogs, and newspapers can be very effective in communicating risk to a variety of audiences. However, in some cases, the actual content is often out of the control of those who are communicating the risk. (See Chapter 16 for information on working with the media.) If you are writing the article:

- Make sure that the publication's readers match your intended audience. If you do not reach the people you were trying to reach, it does little for your risk communication efforts. Most journal and newspaper publishers will tell you who reads their publications.
- Consider professional journals. For certain occupational risks, for example, carpal tunnel syndrome, your audience may well be members of professional societies or unions. A well-written article in their publication may reach your intended audience faster than some other forms of communication.

If written by someone knowledgeable about the risk who can communicate well, articles in professional or trade journals, popular press magazines, blogs, and newspapers can be very effective in communicating risk to a variety of audiences.

Technical Reports and Books

Although intimidating for many readers, technical reports and books are needed by those who want to see more detailed data to form their own opinions. These longer information materials can meet the needs of several segments of your audience: the expert who has extensive technical information or wants it, the reader with some background in the risk who wants additional in-depth information, and the neophyte who is interested in this type of information. To meet the needs of these segments of your audience, organize the document from the back to the front. That is, place the technical detail—computer runs, tables of supporting data, lists of standards, and quality assurance data—in appendixes or supporting documents. (In online reports or e-books, you can include hyperlinks that directly link summary information and references to the supporting detail.) This information will serve the expert. Then, use the information as a basis for a report or book that can be read at the 10th-grade level; this will generally serve

Although intimidating for many readers, technical reports and books are needed by those who want to see more detailed data to form their own opinions.

the reader with some background in the risk. Use the report or book information as a basis for a summary with a minimum of technical terminology; this summary should be able to be read at the sixth-grade level. This will serve the needs of the neophyte. (We use reading levels here as a guide to content and style, not to imply that all interested readers read at the 10th-grade level or that all neophytes read at the 6th-grade level.)

As mentioned in the section on what to include in written risk communication messages, be sure to include helpful hints, a glossary, and an index to help all readers. Provide additional information-identifying devices, such as introductions that summarize key points for each major section; transitions between sections, paragraphs, and sentences; and paragraphs with topic sentences. Craft sentences and paragraphs so that familiar information comes first, with more difficult and newer information coming later.

CHECKLIST FOR INFORMATION MATERIALS

☐ The information is tailored for the intended audience.
☐ The information material includes information on any of the following that will meet audience needs:
  ☐ Goals and content
  ☐ Nature of the risk
  ☐ Alternatives
  ☐ Uncertainties
  ☐ Risk management
  ☐ Risk benefits
  ☐ Audience actions
  ☐ Contact information
  ☐ Glossary
  ☐ Metric conversion
  ☐ "Helpful hints"
  ☐ Index
  ☐ List of related information
☐ The message discusses how the data were developed before the data themselves.

The wording in the message:

☐ Does not present the audience as victims
☐ Distinguishes between estimates and facts
☐ Avoids scientific notation

☐ Avoids mathematic formulas
☐ Avoids exponents
☐ Avoids or defines the term "conservative"
☐ Does not use racist or sexist terms or other terms the audience might find offensive

If the message uses narrative style, it will:

☐ Involve the audience
☐ Be relevant to the audience
☐ Be within the audience's ability to understand and act upon

For newsletters:

☐ Time has been allowed for approvals.
☐ The mailing list has been developed.
☐ There is a mechanism for updating the mailing list.
☐ The newsletter is designed to follow regulations for commercial e-mail, if sent electronically.

The text of the newsletter:

☐ Avoids acronyms and abbreviations
☐ Uses compelling headlines and graphic elements
☐ Is consistent from issue to issue

For pamphlets, booklets, and fact sheets:

☐ Each has been focused to meet specific audience needs.
☐ Each is self-contained.
☐ All strive for consistency.
☐ Each has been distributed where the audience lives.

For posters, advertisements, and displays:

☐ The text portions are written in a language that the audience will understand.
☐ Text messages are clear and simple.
☐ All graphics reinforce the message.
☐ Visuals will be displayed in locations where the audience will see and heed them.

☐ Information is included about where the audience can get additional information.

For articles:

☐ The article is written for publications that will reach the audience.
☐ The article will be in professional journals where appropriate.

For technical reports and books:

☐ The document is structured to meet audience needs.
☐ The document uses language and organization that lead the reader through it.

REFERENCES

Golding, D., S. Krimsky, and A. Plough. 1992. "The Narrative versus Technical Style in Risk Communication." *Risk Analysis*, 12 (2): 27–35.

Green, M., J. Zenilman, D. Cohen, I. Wiser, and R. Balicer. 2007. *Risk Assessment and Risk Communication Strategies in Bioterrorism Preparedness*, NATO Security Through Science Series-A: Chemistry and Biology. Springer, Dordrecht, The Netherlands.

Hillier, D. 2006. *Communicating Health Risks to the Public: A Global Perspective*. Gower Publishing, Aldershot, Hampshire, UK.

Leahy, J. 1994. "Evaluation of Educational Materials for Farmworker Protection." In *Case Studies of Applied Evaluation for Health Risk Communication*. Workshop, June 9, 1994, Annapolis, Maryland. U.S. Department of Health and Human Services, Office of Disease Prevention and Health Promotion. https://health.gov/environment/Casestudies/profiles.htm (accessed January 29, 2018).

TrainingOnline. 2006. "The Impact of Language and Culture on Job Safety." *Reliable Plant Magazine*, January.

Wilson, T. 1989. "Interactions between Community/Local Government and Federal Programs." In V. T. Covello, D. B. McCallum, and M. T. Pavlova, eds., *Effective Risk Communication*. Plenum Press, New York, pp. 77–81.

ADDITIONAL RESOURCES

Federal Trade Commission. 2009. CAN-SPAM Act: A Compliance Guide for Business. Federal Trade Commission. https://www.ftc.gov/tips-advice/business-center/guidance/can-spam-act-compliance-guide-business (accessed September 11, 2017).

Kolin, J. L. and P. C. Kolin. 1985. "Instructions." In *Models for Technical Writing*. St. Martins Press, New York.

Univ Chicago. 1982. "Indexes." In *The Chicago Manual of Style*. The University of Chicago Press, Chicago, Illinois, pp. 511–560.

14

VISUAL REPRESENTATIONS OF RISKS

From hieroglyphics on cave walls to virtual reality devices, humans have always gravitated toward visual ways to communicate. It is not surprising, then, that when people are trying to understand and make decisions about risks, they often want to see various aspects of the risk in visual or graphic formats. Those who communicate risk should be aware of the power of well-chosen visuals to help people understand and think about risks. The human brain has a remarkable capacity to assimilate visual information.

People have been shown to "take in" more than 600 pictures without any particular effort and then, with more than 98% accuracy, distinguish them from different pictures that are added to the original 600 (Shepard 1967).

> What is important is the ability to intuit and communicate the human meaning of data.
> —Lawrence Wallack et al. (1993, p. viii), Director, Berkeley Media Studies Group

Visuals have been shown to help people understand and remember content (Graber 1990; Lang 1995; Shepard 1967). For example, consumer comprehension of nutrition information on product labels was improved when bar

---

Risk Communication: A Handbook for Communicating Environmental, Safety, and Health Risks, Sixth Edition. Regina E. Lundgren and Andrea H. McMakin.

© 2018 The Institute of Electrical and Electronics Engineers, Inc., and Regina E. Lundgren and Andrea H. McMakin. Published 2018 by John Wiley & Sons, Inc.

graphs and pie charts, rather than words only, were used (Geiger et al. 1991). Carefully chosen pictures make information transmission more rapid, realistic, and accurate than is possible in purely verbal messages (Graber 1990).

Visuals help clarify abstract concepts, which often are inherent in risk-related information. One study found that people making mental comparisons involving abstract concepts increased their response times when pictures, rather than words, were used (Paivio 1978). Good visuals help audiences construct mental models of abstract or complex concepts (Graber 1990). A typical study tested people's comprehension and problem solving, with and without graphics, about how lightning is created (Mayer et al. 1996). People who were given captioned figures along with explanatory text showed increased comprehension and problem solving than those who received the text only.

Beyond improving comprehension and recall, visuals can help people put facts into context. Numerical information in pictorial formats such as charts can make it easier to get a more holistic (bigger picture) view than with numbers alone, helping users gain more insights into the information (Lacerda 1986). Graphics also reveal data patterns that may go undetected otherwise (Tufte 1990).

This chapter describes ways to represent risk-related information visually, whether in photos, pictures, illustrations, graphs, charts, tables, labels, or other forms. Those who are communicating risk often use visual representations of risks in explanatory materials such as displays, posters, fliers, fact sheets, flip charts, presentations, newsletters, booklets, product labels, videos, websites, social media, and other multimedia sources. There are almost an unlimited number of options for portraying risk information visually. The key is to tailor the design and use of the format to the needs of the interested individuals or groups. No one presentation format fits all people and situations. Our intent is to give those who are communicating risk some ideas, tools, and guidelines for communicating risk information pictorially.

One important caveat is that the way risks are presented is only one aspect of the way people perceive and act on risks. Some risk experts believe that if they can just find the right way to portray a risk, the public will draw the same conclusions about the risk as do the technical experts (or policy experts, risk managers, plant managers, or government and public health officials). As described in Chapter 4, many other factors affect the way people respond to risks, such as the nature of the risk and the trustworthiness of those communicators explaining it (Bord and O'Connor 1992; Johnson et al. 1992; Slovic 1987). The way quantitative information is presented, though important, is only one contributing factor.

Regardless of the role of pictorial representations, they can serve as powerful tools to help people understand various aspects of risks and their alternatives. In portraying risks visually, those who are communicating risk should aim for approaches that are clear, comprehensible, nonmanipulative, and useful for making decisions. This chapter draws on research and practice to recommend practical approaches for communicating risk. For simplicity, the words *graphic*, *visual*, and *pictorial representation* are used interchangeably unless specified.

DESIGN VISUALS FOR SPECIFIC AUDIENCES AND USES

In deciding which aspects of a risk to portray and how to present them, you will need to identify three things: what people want to know, what they need to know to make an informed decision, and how the visual information will be used.

The first step is to analyze your audience's information needs. Different people may want different kinds of information about a risk. In one study of local river contamination, state regulators wanted to know whether the contamination levels would rise over the legal limits, and under what conditions. Farmers wanted to know the potential effects of irrigating their crops with the water. Native American tribes were concerned about how the environmental problems could affect future generations. They also wanted to know whether tribal members whose diets were heavily dependent on locally caught fish were more at risk. Those involved with the river contamination study worked closely with the stakeholders throughout the study to make sure that the results would portray all of these aspects of the risk. Thus, the study contained graphics for different conditions throughout time, showing contaminant levels for various kinds of river uses.

> Good design should take into account how, when, and where the information is used.
> —Edward R. Tufte (1997, p. 115)

Follow the advice for audience analysis in Chapter 8. The results will help you determine what you may want to show visually, and in what format.

In many communication efforts, especially in care communication efforts, it is necessary to go beyond what people want to know. Include what people need to know, but may not think to ask, about the risk to knowledgeably evaluate it. The mental models research approach described in Part I is one way to identify important factual misperceptions or information gaps about a given risk that must be addressed in communication materials.

Carnegie-Mellon University used the mental models approach in developing a brochure about electric and magnetic fields. The brochure covers the typical issues about possible health effects and how to avoid them. But the brochure also visually depicts specific information to help people understand risks from electric and magnetic fields, including the strength of fields from various sources, how the strength is affected by proximity to the source, how fields are measured, the stages of an electric power system, ways science gets evidence about health effects, and the concept of dose and exposure (Carnegie-Mellon University 1995). Figure 14.1 shows one such depiction from the brochure. This particular graphic and accompanying explanation were added when it was discovered through testing that laypeople typically underestimated the rate at which the strength of fields decreased with increasing distance from their sources (Morgan et al. 1990).

In addition to identifying what people want and need to know, another factor for designing visuals is to determine where and how the visual will be used. Table 14.1 shows some considerations for various presentation options.

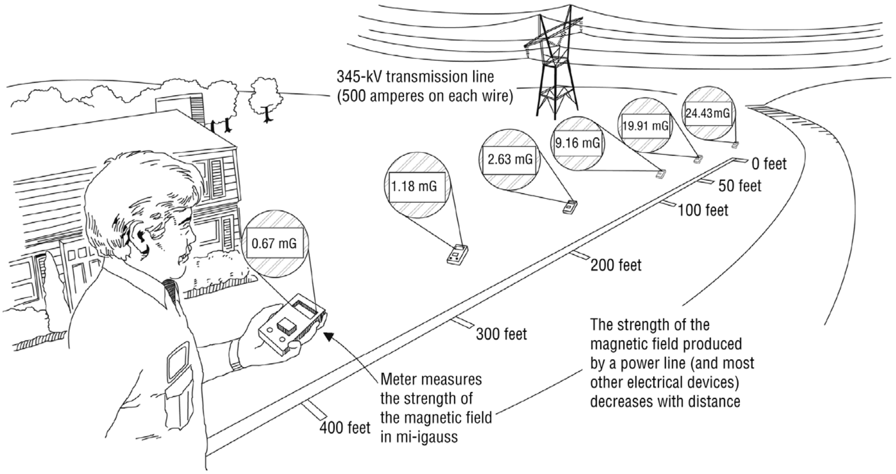

345-kV transmission line
(500 amperes on each wire)
24.43mG
19.91 mG
9.16 mG
2.63 mG
1.18 mG
0.67 mG
0 feet
50 feet
100 feet
200 feet
300 feet
400 feet
Meter measures the strength of the magnetic field in mi-igauss
The strength of the magnetic field produced by a power line (and most other electrical devices) decreases with distance

Figure 14.1. Illustration from a brochure on health risks of electric and magnetic fields. The figure shows how the strength of a 60-Hz magnetic field decreases with distance from a 345-kV transmission line. (Source: Carnegie-Mellon University 1995, used with permission of the author.)

Table 14.1. Considerations for Showing Visuals in Various Media

Where graphics will appear	Considerations
Printed information materials (newsletters, fliers, fact sheets, brochures, booklets)	Such materials usually provide the most detailed explanation of risks; people can read on their own "turf" at a convenient time. Can typically use more detailed visuals, and a wider variety, than in other media, because there is room for explanation. Often the only media where number-intensive graphs, charts, flowcharts, and tables are appropriate
Posters and displays	Typically designed to get attention and convey a few key messages quickly. If displayed at a public forum to discuss the risk, it can contain more explanation. Graphics must be clearly legible from at least a couple of feet away. Message of graphic should be quickly apparent. Pictures and simple graphics are most effective
Presentations	Make sure the entire audience can see all aspects of the visuals being shown, or use handouts. Tailor visual content to background, knowledge, and interests of majority of audience members. Use supplementary print materials for those who want more information

Table 14.1. (*Continued*)

Where graphics will appear	Considerations
News media	Usually aimed at a broad, general audience. Graphics are typically designed to attract attention and convey a single key point. Keep visuals simple, uncluttered. For TV, consider showing people dealing with the risk. For newspapers, consider picture-oriented visuals (such as icons or symbols) that represent how the risk is carried or mitigated. See Chapter 16 for more information
Technology-assisted communication, social media, multimedia	Often interactive and tailored to specific interests. Good opportunity to present technology-related visuals at several levels, such as a summary graphic, more detailed visuals, communication, and explanations for those who want to “drill down” to learn more. Good for multimedia showing movement, including animations, virtual reality, video clips, and streaming video. See Chapter 18 for more information

MATCH THE VISUAL PORTRAYAL TO THE INFORMATION TO BE CONVEYED

Not every type of risk or aspect of it lends itself to pictorial representation. How do you determine when a visual representation of risk is needed, and how do you decide the best way to show it? Some common kinds of risk information that lend themselves to pictorial representations include the following:

- The nature of the risk and its effects
- How large or significant the risk is
- How likely the risk is to occur and the chances that it will affect people
- How much the risk has increased or decreased over time
- Alternatives to the risk and the benefits and dangers associated with alternatives

Table 14.2 shows potential ways to address each of these factors visually. As described in the next sections, select the approach(is) based on an audience analysis and on pretesting.

One way to plan visuals is to pose a series of questions that address the key issues, then determine how to answer them visually. An example of how to use that process is shown here. Key questions were used to guide the selection of visuals for an annual school safety report (St. Clair 1956):

- How do the accident statistics of our locality compare with those on a national basis or with those in similar communities? A line graph was suggested for comparing the local accident rate with the national rate.

Table 14.2. Options for Portraying Various Aspects of Risk Visually

Risk information	Options for visual format
The risk and its effects	If the effects of the risk can be seen (such as a visible health effect, effect on plants and foods, etc.), depict them in a photo or illustration to help people identify the risk. Also, consider showing conditions leading to or indicating a risk, such as blocked fire doors in an industrial plant, high-power lines for electromagnetic fields (Figure 14.1), skull and crossbones indicating poison on warning labels, or people demonstrating unhealthy or unsafe behaviors and their consequences
Size and significance of the risk	Show the risk in the affected population, using numbers or charts. Show the risk over time, increasing or decreasing, such as in a line graph or bar chart. Compare judiciously with other similar risks to show relative magnitudes (see Table 14.3 and Chapter 6). Consider including a recommended "action" level—a point at which people may want to take action to mitigate the risk (see Table 14.3)
Likelihood of risk for specific people	Show probabilities and uncertainties for various conditions. Consider phrasing as "X in Y chances of occurring" under certain conditions. Tables, charts, and graphs can show various risk levels for various situations (see Figure 14.5). "If-then" flowcharts can help people walk themselves through the risk probabilities (see Figures 14.7 and 14.8)
Change over time	Use graphs, charts, or pictograms (small pictures representing the risk) to indicate trends over time. Consider several different representations if many variables are involved, such as conditions that change the risk over time
Alternatives to the risk, with corresponding benefits and dangers	Compare alternatives and list pros and cons of each. Consider using tables if there are shared variables among the alternatives and the alternatives are being compared in a similar way (costs, environmental effects, health effects, etc.). If the alternatives are not easily comparable, use formats that do not invite comparison on the same scales

- Has progress in accident prevention over the last year been made? A bar graph was suggested for comparing relative magnitudes: reduction in accidents in the current year compared with past years.
- What shortages are noticeable in our safety education? A line graph to show the norm and a bar chart to show deviations were suggested for showing accident trends that may need attention in the upcoming year.
- What special emphasis should be made during the next school year? A pictograph was suggested for symbolizing the curriculum areas requiring more safety emphasis.

As the example suggests, sometimes the best approach is to show as many aspects of the risk as possible, giving people more information and choices. It may be helpful to use several graphics, each highlighting a certain aspect of the risk. One study found that a presentation which included the most information scored as well as or better than other formats on almost all measures of communication success (Weinstein et al. 1989). There was no evidence that respondents were confused by the amount of information.

Various tools are available to help communicators determine the best ways to depict their data. For example, at the time of this writing, a free online resource, The Data Visualisation Catalogue (https://datavizcatalogue.com/) shows a library of 60+ information visualization types, with detailed descriptions and examples of each. This source helps you decide which formats to use, depending on what you want to show. The examples range from simple (brainstorm, dot map, Venn diagram) to more complex (nightingale rose chart, stem and leaf plot, radial bar chart).

Another example of an online, open-source tool is RAWGraphs (http://app.rawgraphs.io/), which provides a free data visualization framework to convert complex data. Users can upload raw data, such as from spreadsheets, and choose the format in which the tool will display it, for example, scatterplot, bar chart, pie chart, time series, weighted hierarchy, and so on.

PRETEST GRAPHICS WITH THOSE WHO WILL USE THEM

After you have researched your audience, identified the uses of your graphics, and prepared an initial set of graphics, the next step is to pretest them with people who represent your target audiences. Pretesting graphics is usually done as part of a broader evaluation of messages and/or materials. For example, it is common to pretest an entire brochure or oral presentation containing graphic elements. Pretesting typically provides feedback on the graphic elements as well as other aspects of the message and presentation. Here, we focus on how to get the most out of pretesting for graphics.

> Poorly designed or produced visuals are worse than no visual at all.
> —Peter J. Hager and H. J. Scheiber (1997, p. 171)

Use interviews, discussion groups, and other techniques to get maximum information. (See "Whenever Possible, Pretest Your Message" in Chapter 6.) Ask people what they think each pictorial graphic means. The answer will help you determine whether your graphics are meeting their objectives. Ask whether anything in the pictures, tables, or charts is unclear, misleading, confusing, incomplete, or inaccurate. Ask what feelings are evoked and what words come to mind when viewing specific graphics. In addition, ask people about their overall reactions to the graphics. You may discover that some graphics come across as patronizing, scary, or overly technical, or that they carry an unintended message. For example, the U.S. Department of Homeland Security replaced the visual alerts of its Homeland Security Advisory System in 2011 after public and agency comments. Those who commented wanted alerts that were specific and time dependent, clearly delineated the affected areas, and provided guidance on actions to take.

After hearing from your audience, make decisions about how to modify your graphics, add more, or eliminate them to meet your audience's needs and your communication objectives.

What does pretesting reveal about graphic representations? The following is an example of some comments and changes resulting from pretesting of an information booklet about environmental risks (Pacific Northwest National Laboratory 1994, 1995). The booklet was designed for the general public. Feedback came from students, teachers, agricultural representatives, state regulators, health department officials and practitioners, environmental advocates, and other community members:

- People wanted to compare the existing contaminant amounts with an existing standard. Wherever applicable, regulatory safety limits for contaminants in drinking water, air, and food were included in the applicable illustrations and tables. Figure 14.2 shows an example of a redesigned map.
- People wanted more orientation and clarification of maps. Maps showing contamination locations were clarified to show the direction of contaminant movement (see Figure 14.2). A small state map was included to help the reader locate the smaller geographic area shown on the map (Figure 14.3).
- Some people thought that photos of families enjoying the outdoors were not representative of actual conditions and that they appeared to put an overly "happy face" on a serious issue. Such photos were replaced with more informative ones such as workers gathering river water samples.
- People had trouble understanding illustrations that included numbers such as contaminant levels and quantitative exposure effects over time, regardless of which graphic format was used to convey this information. These illustrations were eliminated and discussed narratively in the text instead.
- People wanted to put events in a historical context and see at a glance when certain cleanup actions would be completed. Visual time lines (Figure 14.4) were added to show key dates and events.
- A table of numerical environmental monitoring results was seen as reference-type information that would be useful only for certain readers. The table was moved to the back so that its more detailed nature would not interrupt the narrative "story" before it.

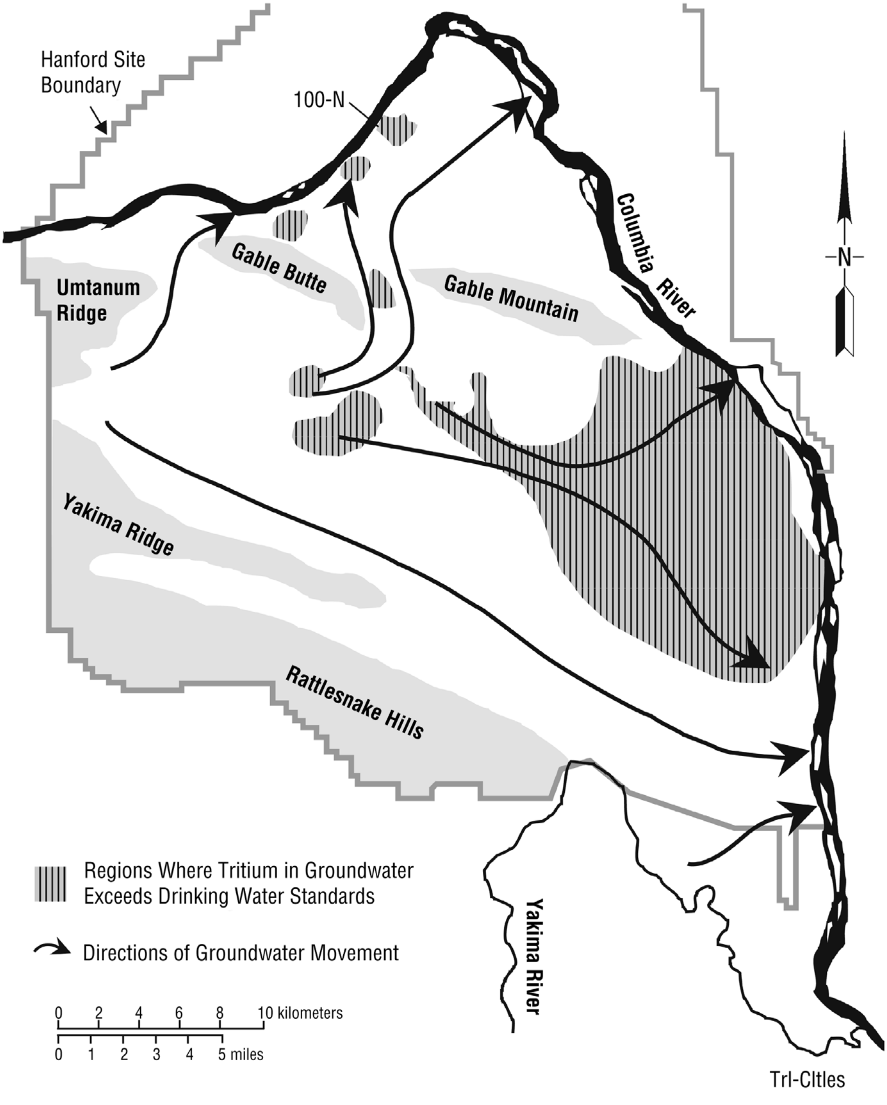

Hanford Site
Boundary
100-N
Columbia River
Gable Butte
Umtanum Ridge
Gable Mountain
Yakima Ridge
Rattlesnake Hills
N
Regions Where Tritium in Groundwater Exceeds Drinking Water Standards
Directions of Groundwater Movement
0 2 4 6 8 10 kilometers
0 1 2 3 4 5 miles
Yakima River
Tri-Cities

Figure 14.2. Redesigned map of groundwater contamination on a federal site in 1994. The map shows areas where drinking water standards were exceeded in the past years. (Source: Pacific Northwest National Laboratory 1995.)

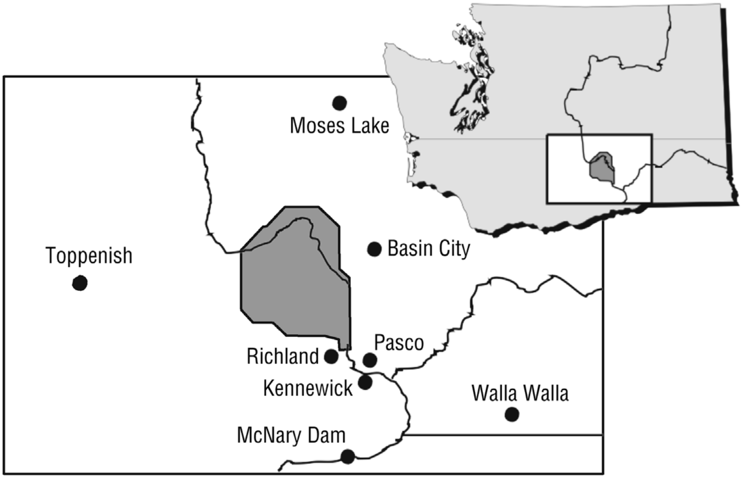
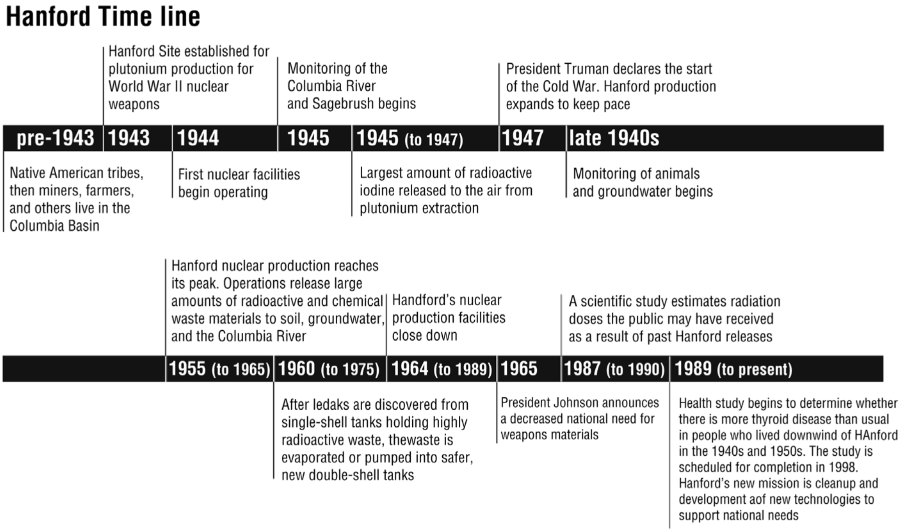


Figure 14.3. "Locator" state map used in conjunction with a more detailed map. (Source: Pacific Northwest National Laboratory 1995.)



Hanford Time line

pre-1943 Native American tribes, then miners, farmers, and others live in the Columbia Basin

1943 Hanford Site established for plutonium production for World War II nuclear weapons

1944 First nuclear facilities begin operating

1945 Monitoring of the Columbia River and Sagebrush begins

1945 (to 1947) Largest amount of radioactive iodine released to the air from plutonium extraction

1947 President Truman declares the start of the Cold War. Hanford production expands to keep pace

late 1940s Monitoring of animals and groundwater begins

1955 (to 1965) Hanford nuclear production reaches its peak. Operations release large amounts of radioactive and chemical waste materials to soil, groundwater, and the Columbia River

1960 (to 1975) After ledaks are discovered from single-shell tanks holding highly radioactive waste, thewaste is evaporated or pumped into safer, new double-shell tanks

1964 (to 1989) Handford's nuclear production facilities close down

1965 President Johnson announces a decreased national need for weapons materials

1987 (to 1990) A scientific study estimates radiation doses the public may have received as a result of past Hanford releases

1989 (to present) Health study begins to determine whether there is more thyroid disease than usual in people who lived downwind of HAnford in the 1940s and 1950s. The study is scheduled for completion in 1998. Hanford's new mission is cleanup and development aof new technologies to support national needs

Figure 14.4. Time line of dates and events. The time line provided a historical context for explaining risks associated with a contaminated site. (Source: Pacific Northwest National Laboratory 1995.)

USING VISUALS TO PERSONALIZE RISK INFORMATION

People often want to know what risks mean to themselves or to their family members. Visual displays can help personalize risk information.

Photos are effective for realistically depicting visible risk characteristics that can affect individuals. Health professionals often use photos in brochures or posters to show patients warning signs of certain health conditions that they should watch for. For example, photos can be used to accurately show early gum disease and potential skin cancer signs. County extension agents and pesticide control officials use photos to indicate damage done by certain pests, as well as to help people recognize the effects of improperly applied pesticides on plants.

Another way to personalize risk information is to show people various conditions associated with the risk and how those might apply to specific individuals. One information booklet used the chart in Figure 14.5 to help people determine their own exposure to radiation from various sources. During pretesting, people consistently rated this chart as one of the most useful pieces in the booklet.

The University of Rochester used a similar personalized approach in its self-test for nicotine addiction, which appears in a smoking cessation guide (Figure 14.6). A score of five or higher indicates possible nicotine addiction.

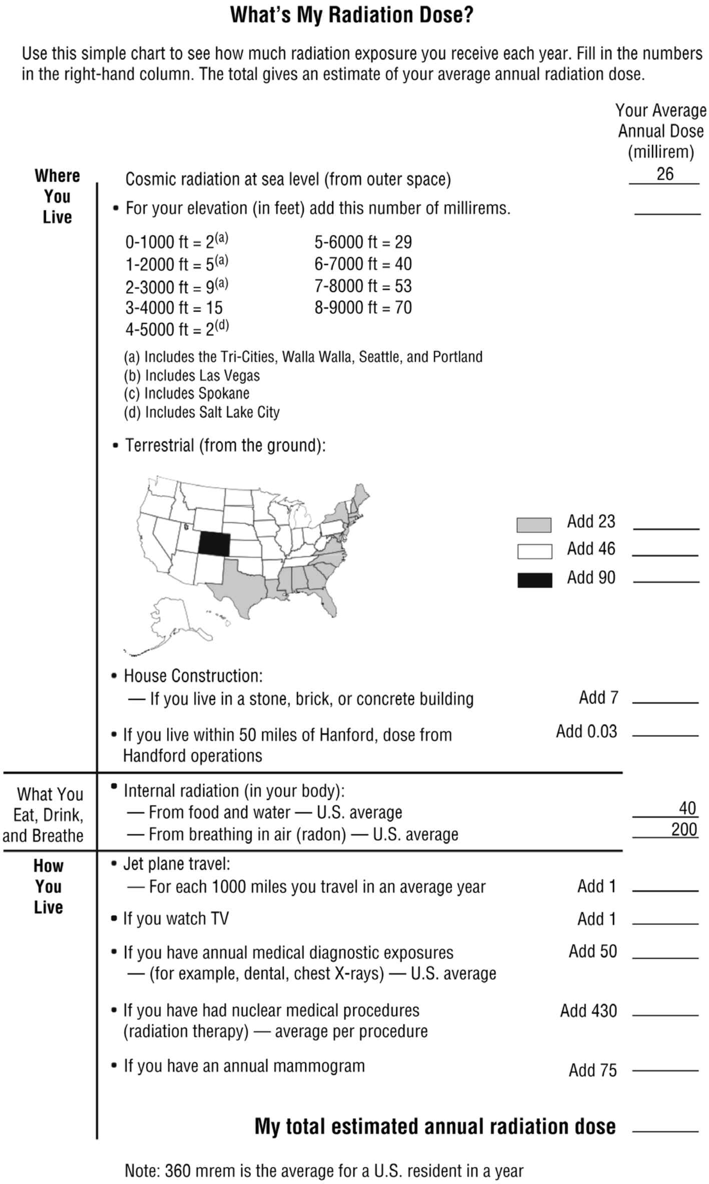
A regional study funded by the U.S. Centers for Disease Control and Prevention used the "road map" in Figure 14.7 that people could follow to find their own radiation dose from past radiation releases, based on demographic and lifestyle factors. Once people identified "their" category, they could find their own radiation dose in the ranges given in a corresponding chart (Figure 14.8). People who viewed these graphics indicated that they were easy to follow and provided helpful information.

COMPARING RISKS IN VISUAL FORMATS

Laypersons and experts often want to know how risks, especially unfamiliar ones, compare with a more common risk or with alternatives. Visuals can be used to compare magnitudes, effects, and alternatives on a common numeric scale, for example.

In one study, people appreciated seeing the health risks from geologic radon and asbestos compared with health risks from smoking (Weinstein et al. 1989). The subjects stated that the comparison helped them understand the data and reduced ambiguity about the risk. The authors noted that the comparison was appropriate because smoking increases the risks from both radon and asbestos.

Table 14.3 shows another way to depict radon risk for smokers by comparing it with other common hazards. The U.S. Environmental Protection Agency (EPA) uses this table to help citizens understand their risk of radon in the home and to recommend action. (An accompanying table, not shown here, depicts risks for the nonsmoker.)



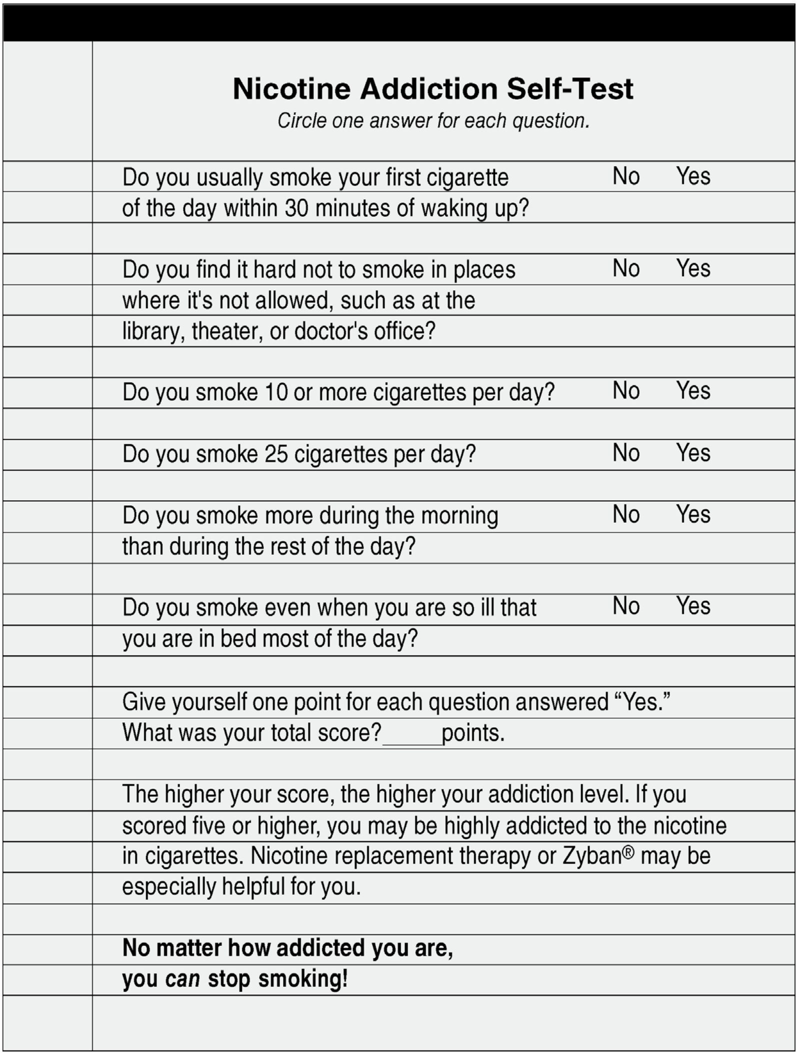
What's My Radiation Dose?

Use this simple chart to see how much radiation exposure you receive each year. Fill in the numbers in the right-hand column. The total gives an estimate of your average annual radiation dose.

			Your Average Annual Dose (millirem)
Where You Live	Cosmic radiation at sea level (from outer space)		26
	• For your elevation (in feet) add this number of millirems.		______
	0-1000 ft = 2(a) 1-2000 ft = 5(a) 2-3000 ft = 9(a) 3-4000 ft = 15 4-5000 ft = 2(d) 5-6000 ft = 29 6-7000 ft = 40 7-8000 ft = 53 8-9000 ft = 70		
	(a) Includes the Tri-Cities, Walla Walla, Seattle, and Portland (b) Includes Las Vegas (c) Includes Spokane (d) Includes Salt Lake City		
	• Terrestrial (from the ground):	▨ Add 23	______
		☐ Add 46	______
		■ Add 90	______
	• House Construction: — If you live in a stone, brick, or concrete building	Add 7	______
	• If you live within 50 miles of Hanford, dose from Handford operations	Add 0.03	______
What You Eat, Drink, and Breathe	• Internal radiation (in your body): — From food and water — U.S. average		40
	— From breathing in air (radon) — U.S. average		200
How You Live	• Jet plane travel: — For each 1000 miles you travel in an average year	Add 1	______
	• If you watch TV	Add 1	______
	• If you have annual medical diagnostic exposures — (for example, dental, chest X-rays) — U.S. average	Add 50	______
	• If you have had nuclear medical procedures (radiation therapy) — average per procedure	Add 430	______
	• If you have an annual mammogram	Add 75	______
	My total estimated annual radiation dose		______

Note: 360 mrem is the average for a U.S. resident in a year

Figure 14.5. Chart used to help people determine their own radiation dose from various sources. (Source: Pacific Northwest National Laboratory 1994.)



Nicotine Addiction Self-Test

Circle one answer for each question.

Do you usually smoke your first cigarette of the day within 30 minutes of waking up?	No	Yes
Do you find it hard not to smoke in places where it's not allowed, such as at the library, theater, or doctor's office?	No	Yes
Do you smoke 10 or more cigarettes per day?	No	Yes
Do you smoke 25 cigarettes per day?	No	Yes
Do you smoke more during the morning than during the rest of the day?	No	Yes
Do you smoke even when you are so ill that you are in bed most of the day?	No	Yes

Give yourself one point for each question answered "Yes."
What was your total score?_____points.

The higher your score, the higher your addiction level. If you scored five or higher, you may be highly addicted to the nicotine in cigarettes. Nicotine replacement therapy or Zyban® may be especially helpful for you.

No matter how addicted you are, you *can* stop smoking!

Figure 14.6. Addiction self-test. (Source: University of Rochester School of Medicine and Dentistry 2001, used with permission.)

It is important to note that using comparisons to clarify risks can lead to confusion and outrage rather than illumination, as researchers and practitioners have discovered.

Follow the advice in "Principles for Comparing Risks," in Chapter 6. And, as we have emphasized, the best foundation for making a decision about comparisons is to analyze your audience and pretest the information before disseminating it.

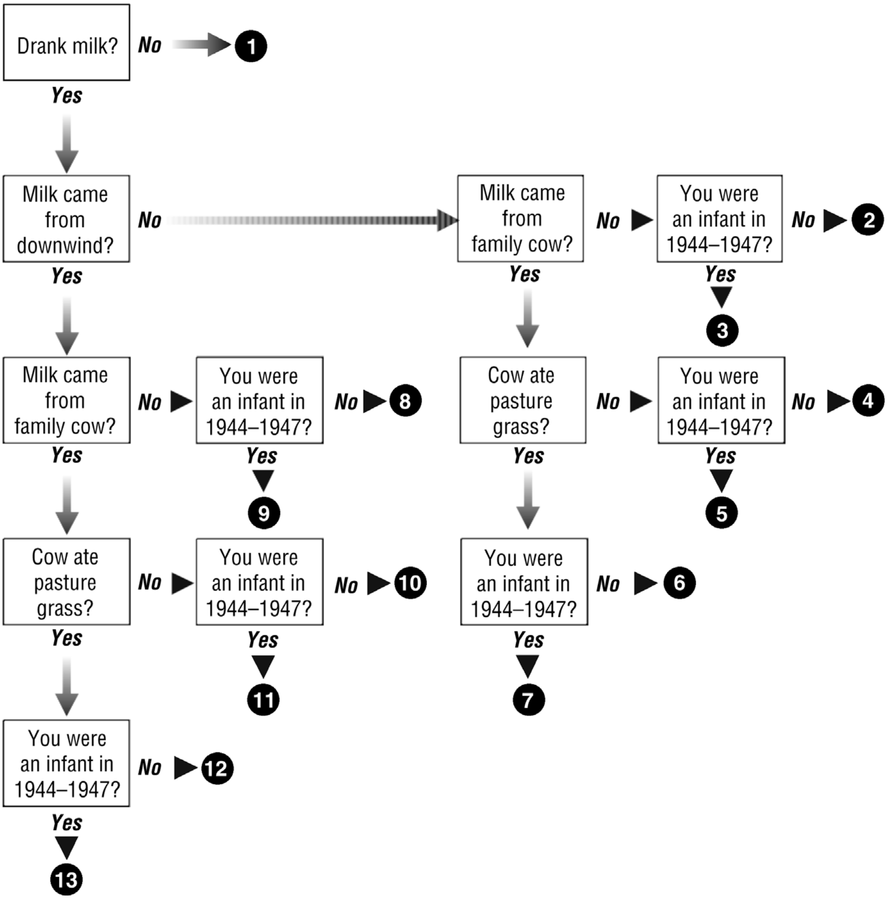

Drank milk?
No
1
Yes
Milk came from downwind?
No
Yes
Milk came from family cow?
No
You were an infant in 1944–1947?
No
2
Yes
3
Milk came from family cow?
No
You were an infant in 1944–1947?
No
8
Yes
9
Cow ate pasture grass?
No
You were an infant in 1944–1947?
No
4
Yes
5
Cow ate pasture grass?
No
You were an infant in 1944–1947?
No
10
Yes
11
You were an infant in 1944–1947?
No
6
Yes
7
You were an infant in 1944–1947?
No
12
Yes
13

Figure 14.7. Example "road map." By answering the questions, people could identify the category into which they best fit, as indicated by numbered circles. (Source: Technical Steering Panel 1990.)

STATIC VERSUS INTERACTIVE VISUALS

Another dimension of visual formats is presenting the risk information in an interactive or static format. It seems intuitive that asking the user to actively process a graphic, such as by creating, changing, or completing it, would improve comprehension and decision making more than just passively viewing the graphic.

However, this is not necessarily the case. In one study, people were asked either to look at a static copy of, or fill in a graph of, the risks from two thyroid cancer treatments and then identify the better treatment option. However, the interactive risk graphic backfired. Fewer people completed it, and they were also less likely to recognize the best treatment option than those who viewed the static

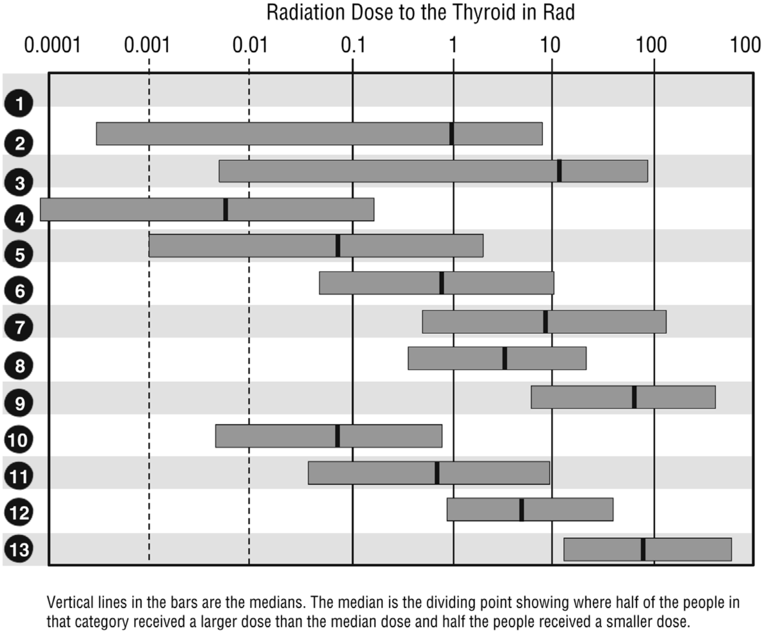


Figure 14.8. Range of possible radiation doses by category. The numbers in the circles correspond to those in Figure 14.7. (Source: Technical Steering Panel 1990.)

Table 14.3. Home Radon Risk for Smokers and Corresponding Recommendations

Radon level	If 1000 people who smoked were exposed to this level over a lifetime . . .	The risk of cancer from radon exposure compares to . . .	What to do: Stop smoking and . . .
20 pCi/L	About 135 people could get lung cancer	100 times the risk of drowning	Fix your home
10 pCi/L	About 71 people could get lung cancer	100 times the risk of dying in a home fire	Fix your home
8 pCi/L	About 57 people could get lung cancer		Fix your home
4 pCi/L	About 29 people could get lung cancer	100 times the risk of dying in an airplane crash	Fix your home
2 pCi/L	About 15 people could get lung cancer	2 times the risk of dying in a car crash	Consider fixing between 2 and 4 pCi/L
1.3 pCi/L	About 9 people could get lung cancer	(Average indoor radon level)	(Reducing radon levels below 2 pCi/L is difficult)
0.4 pCi/L	About 3 people could get lung cancer	(Average indoor radon level)	

Source: U.S. Environmental Protection Agency et al. (1992).

version. The authors concluded that interactivity, though visually appealing, can present a cognitive burden and distract people from understanding relevant statistical information (Zikmund-Fisher et al. 2011).

It is important to note that this research does not rule out the use of online collaborative or other technology-based visual formats. In fact, virtual worlds and other immersive environments have been shown to be useful for learning and training, especially in health care professions (Hansen 2008). Nevertheless, the static versus interactive study shows that greater technology sophistication is not always better. As always, we recommend tailoring the format to the audience and purpose, and pretesting the format in advance.

DEPICTING PROBABILITY AND UNCERTAINTY

Risk communicators often struggle with how to present two particular characteristics of risks: probability and uncertainty. Deaths, disease, or injuries can happen at various levels or under various conditions.

Probability is how likely the event is to occur. An example of explaining probability is telling someone that they have a 1 in 10 chance of getting a certain kind of cancer in their lifetime. Identifying the probability that something will happen is often based on known and unknown factors. The known factors for predicting cancer occurrence could include age, gender, and smoking habits.

> Probability is how likely the event is to occur. Uncertainty represents the factors about a hazard that are not completely known.

Uncertainty represents the factors about a hazard that are not completely known. For example, it is often impossible to say what caused a specific person to contract cancer because the disease may have been triggered by numerous factors, many of which medical science does not yet fully understand.

Research in how people respond to probabilities and uncertainties varies widely in its results, and some of the results conflict with each other. This conundrum is both frustrating and intriguing for those who must communicate such characteristics! Our approach here is to present some of the salient research results and suggest guidance that may be considered for various risk communication situations.

Presenting Probability

In explaining probability, an odds ratio often is used, meaning a fraction with the numerator depicting the chance of something happening and the denominator depicting the total number of possibilities. For example, the odds ratio of 1/10 indicates that there is a 1 in 10 chance that a certain thing will happen.

Even if people understand the magnitude of the probability, there is no way to guarantee how they will respond. In genetic counseling, for example, some clients focus on the denominator of the odds ratio—the large number of people who do not get a negative genetic trait—and are reassured. But other clients focus on the numerator and are frightened by the image of that one person among the many who does suffer harm (Weinstein et al. 1994). In addition, a growing body of research in medicine, public health, and even climate change suggests that people's perception of probability varies with the severity of the outcome. That is, when viewing risk portrayed in the format of "1 chance in X of Y occurring," they will consider X larger as Y gets worse. For example, a 1 in 20 chance of catching the flu will be seen as a lesser probability than a 1 in 20 chance of getting colon cancer (Pighin et al. 2011).

Studies have shown that people prefer probability estimates using human figures (Figure 14.9) rather than bar graphs (Figure 14.10) (Goodyear-Smith et al. 2008; Schapira et al. 2001, 2006). People said that they could identify with human figures and that the information was more understandable and carried more

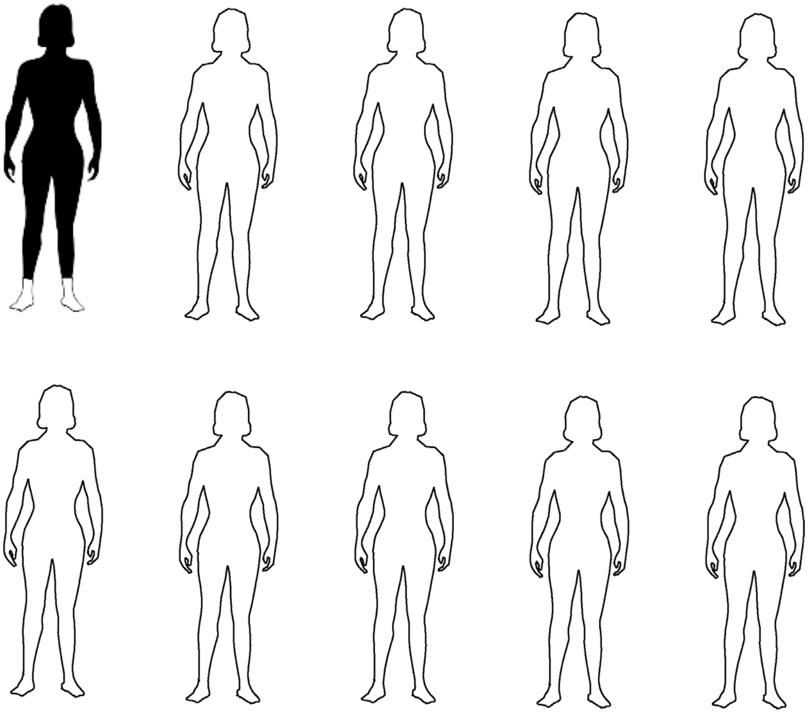


Figure 14.9. Human figures used in risk estimates. The highlighted female figure among a total of 10 represents the 9% lifetime risk of breast cancer for a 50-year-old woman. This depiction was preferred over the bar chart in Figure 14.10. (Source: Schapira et al. 2001, used with permission.)

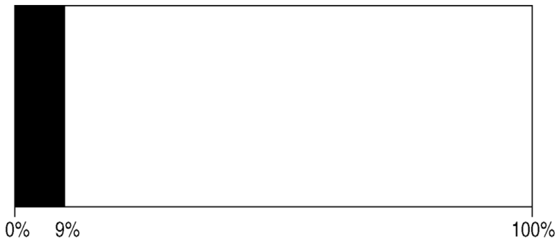


Figure 14.10. Risk estimate in bar graph format. This figure represents the same information as in Figure 14.9, but in a different format. (Source: Schapira et al. 2001, used with permission.)

impact than the bar graph. However, when comparing more than one kind of risk at the same time (cancer, heart disease, stroke), people preferred a vertical bar graph such as that shown in Figure 14.11.

One caution when using human figures such as in Figure 14.9 is not to cross out victims with the letter "X." In a study by the Duke Risk Communication Laboratory, women did not like the idea of having the stick figure women who were affected by breast cancer "x'd" out (Lipkus and Hollands 1999). It is better to color them in, as shown in Figure 14.9.

In another study, women were asked to choose among several graphical formats for communicating the risk of heart disease with and without hormone replacement therapy (Fortin et al. 2001). Women were shown the same risk information portrayed in bar graph, line graph, thermometer graph, 100 faces, and survival curve formats (Figure 14.11). Respondents overwhelmingly choose the bar graph, saying that it was basic, simple, and clearer than the other formats. They also preferred lifetime risk estimates over 10- or 20-year horizons and absolute over relative risks. And they wanted to see a narrative explanation with the graphic displays.

> Human figures may be best for single estimates of risk probabilities, whereas bar charts are more effective for risk probability comparisons.

These studies suggest that for single estimates of risk probabilities, human figures may be best, whereas bar charts are more effective for risk probability comparisons.

For explaining medical risks associated with the likelihood of treatment effects, researchers have found that it is not sufficient to say something like "You have a low chance of experiencing a side effect." Patients interpret "low" and "high" differently. Instead, it is helpful to show patients the difference between baseline and treatment risk visually. Figure 14.12 shows the number of women who would get cataracts without tamoxifen treatment, with a separate color showing the additional number of women who would experience the side effect of

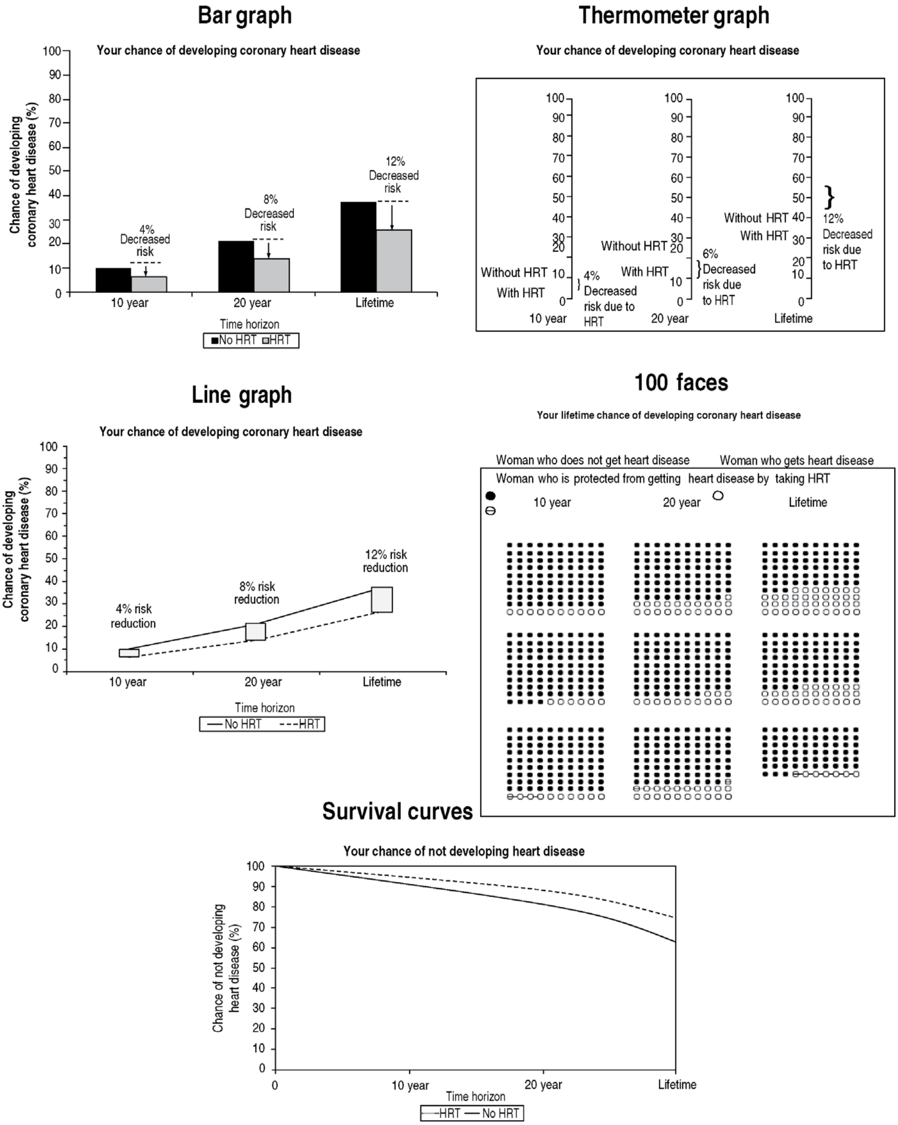


Figure 14.11. Graphical displays of heart disease risk with and without hormone replacement therapy (HRT). Women preferred the bar graph (first display) over the other formats. (Source: Fortin et al. 2001, used with permission.)

cataracts with tamoxifen treatment. Researchers found that in a study of more than 600 women considering taking tamoxifen as chemoprevention, this visual reduced worry about medication side effects and reduced perceived likelihoods of experiencing a side effect (Zikmund-Fisher et al. 2008).

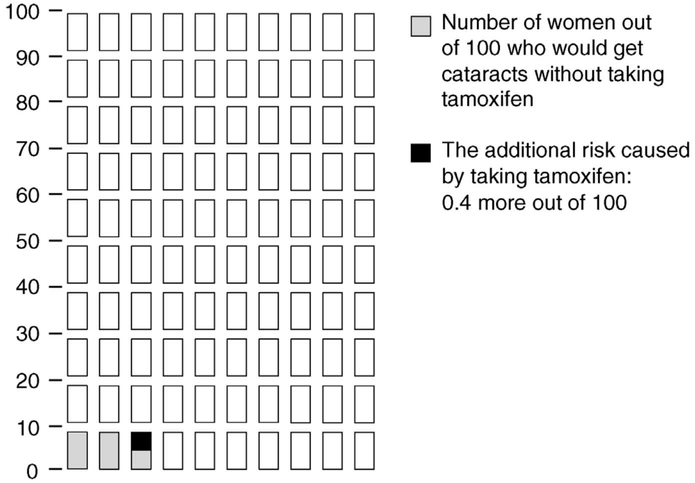


Figure 14.12. Added risk of side effects from medical treatment among 100 women. This visual reduced patients' worry about side effects (cataracts) and the likelihood of experiencing them. (Source: Zikmund-Fisher et al. 2008, used with permission.)

The Presidential/Congressional Commission on Risk Assessment and Risk Management (1997) suggests several approaches to explaining low-risk probabilities that have been found helpful in practice. One is to use analogies: one in a million is equivalent to 30 seconds in a year, 1 inch in 16 miles, or 1 drop in 16 gallons. Another approach is to express risk in terms of the number of persons who might be affected per year or per hypothetical 70-year lifetime. In explaining and portraying these kinds of probabilities, it is important to clarify that the one-in-a-million probability is not an estimate of actual risk but a statistical upper boundary.

Another approach for conveying probabilities is to convert units of population to periods per event, such as 1 death expected in 3500 people. The city of Columbus, Ohio, did an analysis estimating that one death would occur in Columbus in 204 years from an additional cancer risk at the theoretical one-in-a-million level. The analysis compared that risk with frequencies of several deaths per day or every few days for measurable risks, such as ordinary rates of heart disease, cancer, homicide, and automobile collisions. The mayor of Columbus stated that the analogy helps citizens understand the magnitude of the effects on the community caused by federal or state regulations concerning the environment, transportation, labor, or education (Presidential/Congressional Commission 1997). This approach is similar to the one portrayed in Table 14.3.

A single denominator should be chosen for comparisons (for example, 1 in 10,000 and 337 in 10,000). It is easier for people to understand whole numbers (for example, 1 in 10,0000) rather than fractions or decimals (0.01 in 100); thus, if risks are very small, larger denominators will be necessary (Fischhoff et al. 2011).

Avoid attempting to influence people by downplaying or highlighting the magnitude of the risk.

We have two cautions in showing probabilities. Despite these and other examples showing that portraying risk is effective in practice, conflicting studies show that people respond differently to portrayal of risk probabilities than they do to other kinds of risk information (Schapira et al. 2001; Weinstein et al. 1994). Pretesting your information, as described in the section "Pretest Graphics with Those Who Will Use Them," will provide insights for determining the best approach. The second caution is to avoid attempting to influence people by downplaying or highlighting the magnitude of the risk. This is especially true in consensus communication efforts, where the goal is to present the risk as objectively as possible so that people can evaluate it for themselves.

Presenting Uncertainty

Risk assessment is not an exact science and as such carries with it many uncertainties. Uncertainty is often shown as a range of risk estimates or potential consequences, depending on various factors such as the demographics of the population at risk.

Unfortunately, people are unfamiliar with uncertainty in risk assessment and in science in general, making the job of the risk communicator all the more challenging. In one study, up to 20% of respondents reading news stories about risks had difficulty recognizing the presentation of uncertainty in the form of a range of risk estimates (Johnson and Slovic 1995), as opposed to a single number that represented the risk level. Pretesting various visual formats (and narratives) that reflect uncertainty should help reveal confusion and suggest potential visual solutions.

As with probabilities, the way the information is presented affects how people perceive it. Research has shown that people see risks with uncertainties as greater (1) if the risks are more ambiguous, (2) when the unfavorable risk evidence is presented last, (3) when the most unfavorable risk studies were performed most recently, and (4) when some aspect of the risk is substantially negative (Viscusi et al. 1991). Risk communicators should be aware of these factors when presenting uncertainty. The goal is not to present the uncertainty in the most favorable format to persuade people, but to present it as objectively as possible.

In dealing with uncertainty, risk managers and communicators also grapple with the issue of credibility. Acknowledging uncertainty has been shown to increase the perceived trustworthiness of the information sources (by admitting that they do not know the exact number) but less competent (they are not smart enough to figure it out) (Johnson and Slovic 1995). One respondent, upon viewing uncertainty presentations hypothetically published by a U.S. government organization, labeled the agency "honest imbeciles"—a dubious distinction! We agree with practitioners who advocate dealing with uncertainty head-on. It is best to acknowledge uncertainty; explain why it exists; describe what, if anything, can be done to get a better handle on it; and explain how the risk can be reduced in the meantime.

Probability plus Uncertainty

Some risks contain characteristics of both probability and uncertainty, and both must be shown. In one situation, for example, the National Hurricane Center started with a hurricane warning graphic that focused on uncertainty, then, based on public feedback, added another to show probability. The initial graphic (Figure 14.13) is known as the "cone of uncertainty." Interviews, surveys, and testing showed that many people mistakenly assumed that if they were not directly in the path of the black line, they were safe (Broad et al. 2007). In reality, even if the line predicted perfectly the hurricane eye's path— something it rarely does— many people forget that a storm's devastating winds can spread out dozens of

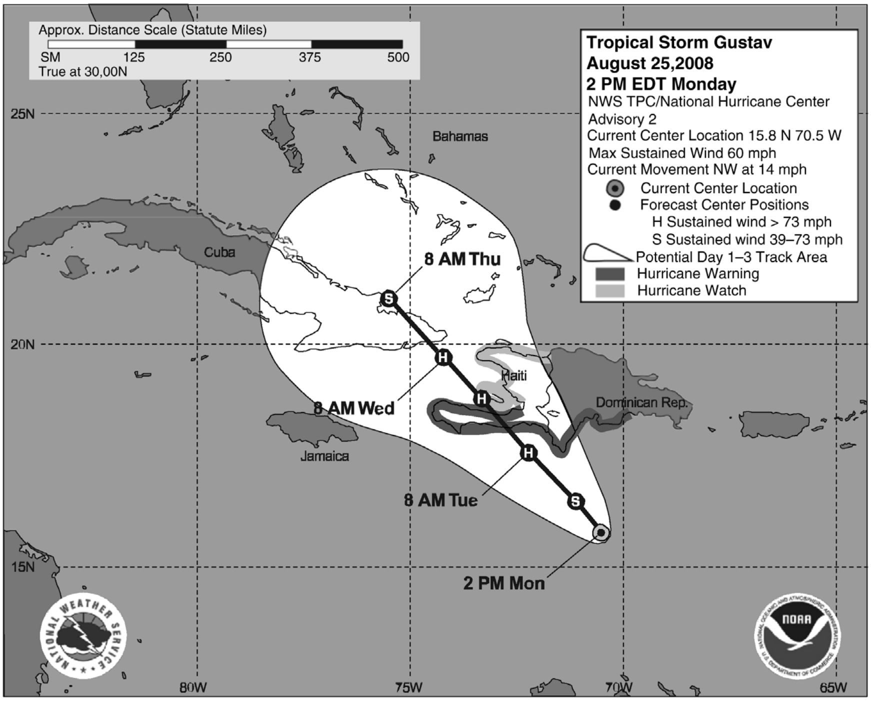

Approx. Distance Scale (Statute Miles)
SM 125 250 375 500
True at 30,00N
Tropical Storm Gustav
August 25,2008
2 PM EDT Monday
NWS TPC/National Hurricane Center
Advisory 2
Current Center Location 15.8 N 70.5 W
Max Sustained Wind 60 mph
Current Movement NW at 14 mph
Current Center Location
Forecast Center Positions
H Sustained wind > 73 mph
S Sustained wind 39–73 mph
Potential Day 1–3 Track Area
Hurricane Warning
Hurricane Watch
25N
20N
15N
80W
75W
70W
65W
Bahamas
Cuba
Haiti
Dominican Rep.
Jamaica
8 AM Thu
8 AM Wed
8 AM Tue
2 PM Mon
S
H
H
H
S

Figure 14.13. A typical "cone-of-uncertainty" graphic used for hurricane warnings. Many people mistakenly assumed that if they were not directly in the path of the black line, they were safe. (Source: National Hurricane Center.)

miles in all directions. So, residents in the entire white area of the cone could be at risk, depending on the severity and impact of the storm.

To overcome the public's overemphasis on the black line, the National Hurricane Center added a graphic in 2006 that shows the probability that tropical storm or hurricane force winds will threaten a specific area over a period of time, such as a 24-hour period (Figure 14.14). Tested for 2 years, this additional graphic gives residents a clearer picture of whether and when they could experience storm-force winds and helps them make important decisions, such as whether to evacuate.

TV weather forecasters, emergency managers, and the public now have access to the full-color graphic, a series of ovals spreading outward from the storm's center. The ovals closest to the center show the highest probability for storm-force winds within a certain time period, and the probabilities get smaller with each bigger oval that surrounds the center.

Some formats show probability and uncertainty together, such as the chance of a certain disease showing up over time in a given community near a toxic waste site. The chances that someone in the community will get cancer from exposure to

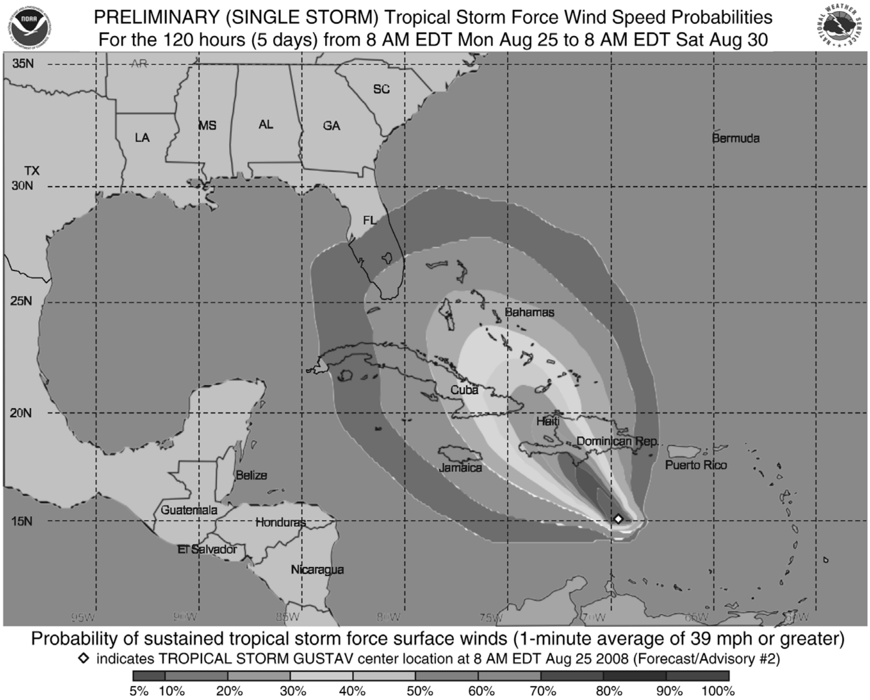

PRELIMINARY (SINGLE STORM) Tropical Storm Force Wind Speed Probabilities
For the 120 hours (5 days) from 8 AM EDT Mon Aug 25 to 8 AM EDT Sat Aug 30
35N
30N
25N
20N
15N
TX
LA
MS
AL
GA
SC
FL
Bermuda
Bahamas
Cuba
Haiti
Dominican Rep.
Puerto Rico
Jamaica
Belize
Guatemala
Honduras
El Salvador
Nicaragua
95W
90W
85W
80W
75W
70W
65W
60W
Probability of sustained tropical storm force surface winds (1-minute average of 39 mph or greater)
◇ indicates TROPICAL STORM GUSTAV center location at 8 AM EDT Aug 25 2008 (Forecast/Advisory #2)
5%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%

Figure 14.14. Additional graphic for hurricane warnings, showing probability by geographic area. The ovals closest to the center of the storm have the highest probability for dangerous winds. (Source: National Hurricane Center.)

the waste site may vary from small to large, with the most likely point on the range shown with a certain degree of confidence.

One statistical format that does this is called a cumulative distribution function, as shown in Figure 14.15. The horizontal axis depicts a range—it could be a range of exposures, potential health effects, or other type of data. The vertical axis depicts the percent of elements in the range that corresponds to a particular number in the range. For example, this figure shows that 50% of people received an exposure between 1 and 10 (units are not specified in this generic example).

Risk communicators should carefully consider and pretest such graphics to determine whether they add value or increase confusion. Ibrekk and Morgan (1987) found that cumulative distribution functions with no explanation were dramatically misinterpreted by laypeople. In cumulative distribution functions that used the statistical concept of a mean, people thought that the mean was much higher than indicated on the graph and often misidentified the maximum as the mean.

The difficulty in communicating with the cumulative distribution function was corroborated in a multiyear environmental risk study funded by the U.S. Centers for Disease Control and Prevention (Technical Steering Panel 1990). Citizens typically did not use or refer to the data shown in cumulative distribution functions. Not one media outlet printed or aired that form of graphic, though it was provided to dozens internationally. Instead, many people focused on the highest (worst-case) number for the risk, regardless of the repeated emphasis of how unlikely it was and how few people were affected by it at that level. A more used portrayal was a series of ranges with the median risk levels within each range, as shown in Figure 14.8.

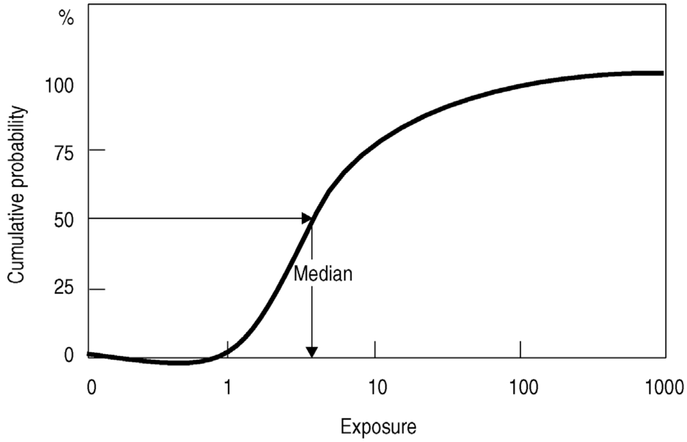


Figure 14.15. Example of a cumulative distribution function.

WARNING LABELS

Warning labels that include visual elements deserve special consideration. A robust body of research exists on the design of warning labels such as those for prescription drugs, herbal remedies, and household chemicals.

Educate yourself about mandates regarding the use of graphics to convey warnings. For example, a number of countries now mandate large, photo- or picture-based warnings on cigarette packages, based on research showing that they cut down on smoking (Brennan et al. 2017; Hammond et al. 2007). Many are purposely revolting, to gain attention and show the seriousness of the risk. Figure 14.16 shows some examples.

A worldwide voluntary guideline exists for labeling chemical hazards: The Globally Harmonized System of Classification and Labeling of Chemicals (see Chapter 3). This is a voluntary hazard classification system developed by the United Nations Economic Commission for Europe and its partners. At least 67 countries had adopted the system at the time this book was published, including the United States in 2012. The U.S. Occupational Safety and Health Administration calls its version the Hazard Communication Standard 2012.

The system requires specific symbols, or pictograms, on labels to indicate certain hazards. For example, the symbol for carcinogens and other health hazards is a white jagged "star" inside a dark silhouette of a human frame (Figure 14.17). It also requires words such as "danger" or "warning" to appear, along with standard phrases assigned to each hazard class.

At the time this book was published, the most recent labeling requirements were shown on the Globally Harmonized System web page (http://www.ehs-world.net/GHS). Be aware that even when such a system is adopted, education may still be necessary to ensure that people understand what the symbols mean. In Zambia, people appreciated nonabstract warning symbols they could relate to, such as skulls and crossbones, flames, or ghost-like images. But other symbols sometimes used to indicate hazards, such as an exclamation point and the St. Andrews cross (a tilted X), were not well understood (Banda and Sichilongo 2006).

Colors have meaning as well. In the agricultural sector, red is associated with high toxicity, while other colors, such as yellow and blue, may not be. Industry terminology for hazards varies as well. The industry and transportation sectors tend to use the word "danger" rather than "toxic" (Banda and Sichilongo 2006).

In the United States, the American National Standards Institute (ANSI) has set a standard, known as Z535.3, for developing and evaluating symbols and warnings, most often used for workplace and commercial hazard signage (ANSI 2002). The standard specifies a minimum 85% correct interpretation and a maximum 5% critical confusion, meaning interpretations that may lead to the direct opposite of the sought behavior.

For example, using the ANSI standard, researchers pretested four warning labels for pharmaceutical packages intended to keep women from taking certain

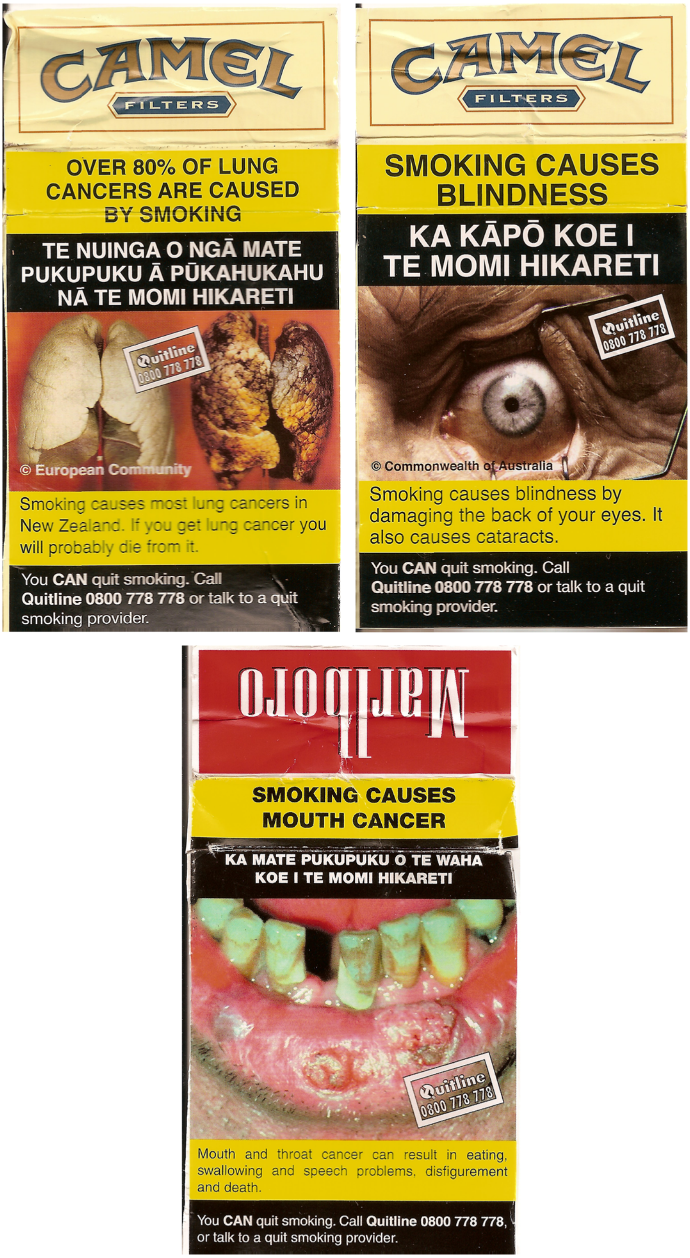

CAMEL
FILTERS
OVER 80% OF LUNG CANCERS ARE CAUSED BY SMOKING
TE NUINGA O NGĀ MATE PUKUPUKU Ā PŪKAHUKAHU NĀ TE MOMI HIKARETI
Quitline 0800 778 778
© European Community
Smoking causes most lung cancers in New Zealand. If you get lung cancer you will probably die from it.
You CAN quit smoking. Call Quitline 0800 778 778 or talk to a quit smoking provider.
CAMEL
FILTERS
SMOKING CAUSES BLINDNESS
KA KĀPŌ KOE I TE MOMI HIKARETI
Quitline 0800 778 778
© Commonwealth of Australia
Smoking causes blindness by damaging the back of your eyes. It also causes cataracts.
You CAN quit smoking. Call Quitline 0800 778 778 or talk to a quit smoking provider.
Marlboro
SMOKING CAUSES MOUTH CANCER
KA MATE PUKUPUKU O TE WAHA KOE I TE MOMI HIKARETI
Quitline 0800 778 778
Mouth and throat cancer can result in eating, swallowing and speech problems, disfigurement and death.
You CAN quit smoking. Call Quitline 0800 778 778, or talk to a quit smoking provider.

Figure 14.16. Examples of tobacco warning labels shown to be effective. These cigarette packages from New Zealand are labeled in English and Maori.

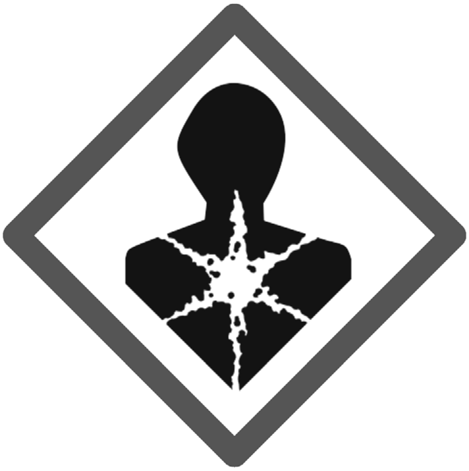


Figure 14.17. Warning symbol for respiratory sensitization, cancer, and other human health hazards. This symbol, with the diamond shape, is part of the Globally Harmonized System of Classification and Labeling of Chemicals.

medication that could harm a fetus (Goldsworthy et al. 2008). Four graphic symbols, shown in Figure 14.18, were tested with one of the target audiences, adolescent girls who could become pregnant.

Pretesting showed mixed results, demonstrating the dilemmas risk communicators sometimes face. Participants judged symbol C as being the most effective because of the universally recognized symbol, the skull and crossbones. But the symbol with the highest correct interpretation was symbol B. Because all the symbols rated fairly high by ANSI standards but differed in preference among the target audience, the researchers declined to choose the "best" one.

However, a key finding was that when text was added to the symbols, as in Figure 14.19, the correct interpretation increased. Specifically, adding the phrase "may become pregnant" made that concept salient to the adolescents, whereas it was not with just the symbol. One way to approach this would be to include the

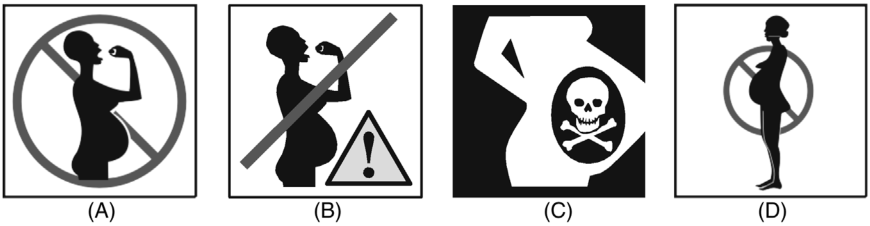
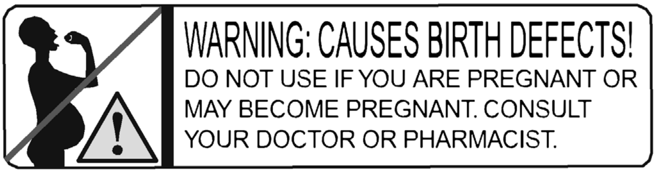


Figure 14.18. Four versions of medication warning labels that were pretested with adolescents. (Source: Goldsworthy et al. 2008, used with permission.)



WARNING: CAUSES BIRTH DEFECTS!
DO NOT USE IF YOU ARE PREGNANT OR
MAY BECOME PREGNANT. CONSULT
YOUR DOCTOR OR PHARMACIST.

Figure 14.19. Medication warning label with text added to increase understanding. (Source: Goldsworthy et al. 2008, used with permission.)

skull and crossbones icon in the best-interpreted symbol (B), add the text warning, and pretest again against the other choices.

CONSIDER USING ACTION LEVELS

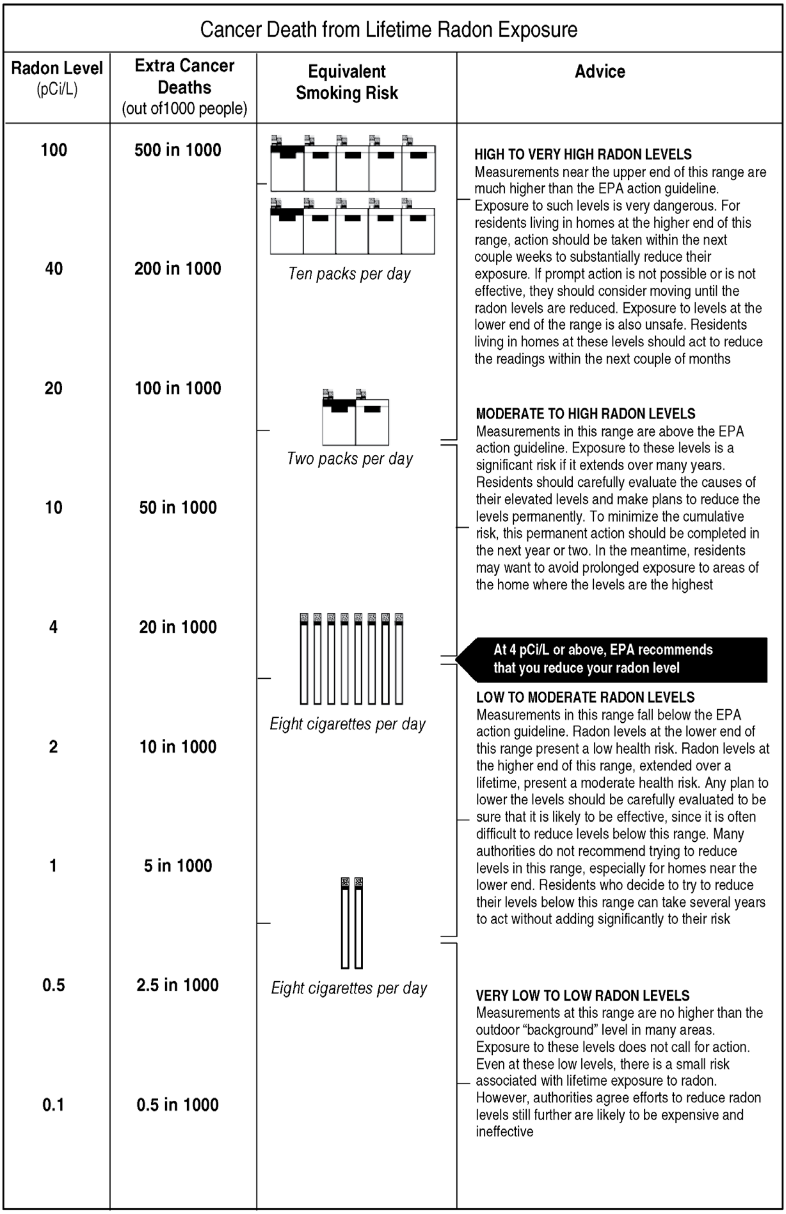
For crisis and care communication efforts, where it is prudent to take a specific action even when uncertainty exists, some specialists advise using an action standard. Table 14.3 shows an example of action standards, where recommendations corresponding to various radon levels are given. If the risk gets to that level, the reader is advised to take action.

A graphic called a risk ladder has been shown to be effective in explaining risks and in recommending associated action levels. Risk ladders help people "anchor" a risk to upper- and lower-bound reference points. Including an action standard with the risks increases the likelihood that people will follow recommendations (Weinstein et al. 1989). Figure 14.20 shows a risk ladder conveying a range of radon risks and associated action levels.

This risk ladder communicates both risk magnitude, relative risk, an action standard (4 picocuries per liter), and advice about how to interpret the risk and what action to take, if any. Studies showed that the risk ladder in Figure 14.20 helped people distinguish among risk levels, identify appropriate mitigation intentions in accordance with their level of risk, and feel confident that they understand the risk (Weinstein et al. 1989).

> Risk ladders help people "anchor" a risk to upper- and lower-bound reference points.

One interesting finding was that people's perceptions of threat are influenced by the location of the risk on the ladder, more so than the numbers themselves (Sandman et al. 1994). Thus, if the communication goal is to get people to pay attention to a risk that they may be apathetic about, placing a risk closer to the top of the ladder will increase perceived risk. A downside of risk ladders is that they may suggest a dichotomy, whereby people may feel that everything up to the action level is safe, and everything beyond it is dangerous. The actual situation is more often a continuum, and those who communicate



Cancer Death from Lifetime Radon Exposure

Radon Level (pCi/L)	**Extra Cancer Deaths** (out of1000 people)	**Equivalent Smoking Risk**	**Advice**
100	**500 in 1000**		**HIGH TO VERY HIGH RADON LEVELS** Measurements near the upper end of this range are much higher than the EPA action guideline. Exposure to such levels is very dangerous. For residents living in homes at the higher end of this range, action should be taken within the next couple weeks to substantially reduce their exposure. If prompt action is not possible or is not effective, they should consider moving until the radon levels are reduced. Exposure to levels at the lower end of the range is also unsafe. Residents living in homes at these levels should act to reduce the readings within the next couple of months
40	**200 in 1000**	*Ten packs per day*	
20	**100 in 1000**	*Two packs per day*	**MODERATE TO HIGH RADON LEVELS** Measurements in this range are above the EPA action guideline. Exposure to these levels is a significant risk if it extends over many years. Residents should carefully evaluate the causes of their elevated levels and make plans to reduce the levels permanently. To minimize the cumulative risk, this permanent action should be completed in the next year or two. In the meantime, residents may want to avoid prolonged exposure to areas of the home where the levels are the highest
10	**50 in 1000**		
4	**20 in 1000**		**At 4 pCi/L or above, EPA recommends that you reduce your radon level**
2	**10 in 1000**	*Eight cigarettes per day*	**LOW TO MODERATE RADON LEVELS** Measurements in this range fall below the EPA action guideline. Radon levels at the lower end of this range present a low health risk. Radon levels at the higher end of this range, extended over a lifetime, present a moderate health risk. Any plan to lower the levels should be carefully evaluated to be sure that it is likely to be effective, since it is often difficult to reduce levels below this range. Many authorities do not recommend trying to reduce levels in this range, especially for homes near the lower end. Residents who decide to try to reduce their levels below this range can take several years to act without adding significantly to their risk
1	**5 in 1000**		
0.5	**2.5 in 1000**	*Eight cigarettes per day*	**VERY LOW TO LOW RADON LEVELS** Measurements at this range are no higher than the outdoor “background” level in many areas. Exposure to these levels does not call for action. Even at these low levels, there is a small risk associated with lifetime exposure to radon. However, authorities agree efforts to reduce radon levels still further are likely to be expensive and ineffective
0.1	**0.5 in 1000**		

Figure 14.20. Risk ladder for radon. Radon levels are compared with the number of extra cancer deaths and, for perspective, an equivalent number of cigarettes smoked. The “advice” column recommends associated action (or no action) levels. (Source: Lipkus and Hollands 1999, p. 152; used with permission.)

risk should convey this. For example, the risk ladder in Figure 14.20, despite including an action level at 4 picocuries per liter, also contains explanations with the advice given at each stage.

ETHICAL PORTRAYAL OF RISK INFORMATION

Many risk communication experts feel that persuasive messages such as fear appeals are manipulative and that people should simply be given the facts and allowed to make their own decisions. Yet beyond being blatantly persuasive, risk information can be portrayed in ways that are arguably deceptive. Here, we focus on several ethical factors that risk communicators should consider when portraying the visual aspects of risks.

> The format used to present statistical information influences people's perception of the likelihood of events.

Researchers have found that the format used to present statistical information influences people's perception of the likelihood of events (for example, Britton 1991; Halpern et al. 1989). In his classic books describing the visual display of quantitative information, Yale University professor Edward Tufte describes how various design "tricks" are used to circumvent what he calls graphical integrity (Tufte 1983). Two of the most common faults that risk communicators should be aware of are as follows:

1. Using pictorial representations that are out of proportion to the actual numerical quantities represented, especially when depicting increases or decreases
2. Using purely decorative design elements (which Tufte calls "chartjunk") that obscure the meaning of data.

Orcutt and Turner (1993) provided an interesting example of data manipulation in a health-related situation. They showed how major news magazines selectively used and displayed government survey data to manufacture a youth "cocaine epidemic" in the mid-1980s. Figure 14.21 shows an adapted version of the data and the treatment imposed by the news magazines.

Another problem that can lead to data manipulation, especially when describing the effect of various medical treatments, is using different reference classes or, more specifically, using relative risks versus absolute risks. Figure 14.22 shows these comparisons.

The two charts both show the effect of two kinds of medications to treat a group of patients. The chart on the left shows only those who experienced a serious side effect as a result. It appears that both medications decreased the chance of having serious side effects by up to 50%, making it more likely that patients would choose to be treated with medication. In fact, pharmaceutical

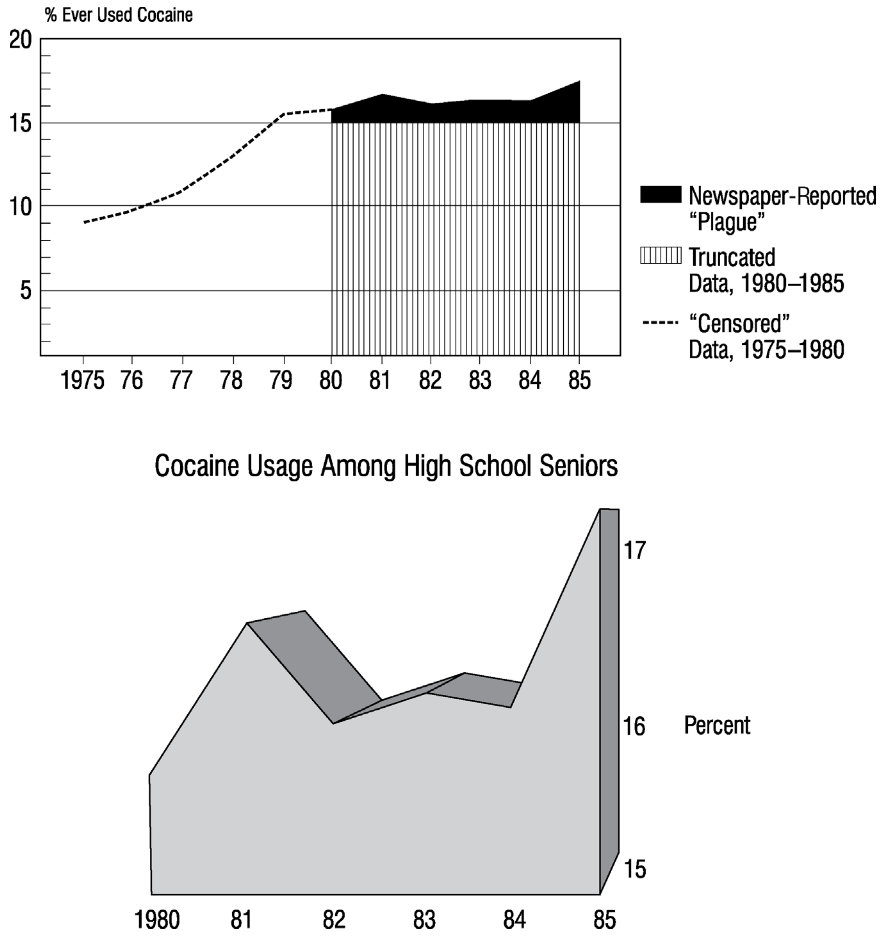


Figure 14.21. Deceptive use of data. The figure on the top shows the original data depicting a trend over time. The figure on the bottom shows how these data were improperly used to depict a different trend. Only certain data from the figure on top were used, and the scale was compressed to accentuate the peaks and thus "reveal" a cocaine "epidemic." (Source: Orcutt and Turner 1993; used with permission.)

claims are all too often guilty of this kind of comparison because the risk reduction appears so significant.

The chart on the right, however, which includes the reference group of 100 people, gives a different perspective. It shows that, compared with the reference group of 100, only about 2% reduced their side effects by taking either of the two medications. One could thus conclude that taking medication does not make much of a difference because most people in the reference group suffered no ill effects, whether they received treatment or not. In fact, many risk communication professionals advocate using absolute versus relative risks because absolute risk is less misleading and allows people to make a more informed decision (Gigerenzer and Edwards 2003).

Beyond the deliberate misuse of graphics to manipulate, graphics can be used carelessly. This can lead to the obscuring of important information and, consequently, faulty and even tragic decisions. Edward Tufte makes a convincing argument that improperly designed pictorial displays linking O-ring damage and temperature failed to clearly convey the risk that led to the 1986 space shuttle *Challenger* explosion (Tufte 1997). As evidence, he shows a series of O-ring-related figures exemplifying the lack of clarity in depicting cause and effect, improper ordering of data, and deceptive "chartjunk."

Tufte also blasts the misuse of PowerPoint® slides as a potential contributor to the *Columbia* space shuttle disaster in 2003. The National Aeronautics and Space Administration (NASA) used the slides, which summarized engineering studies about possible tile damage on the *Columbia*, as a rationale not to investigate the tiles further during flight. Calling the slide presentations a "PowerPoint festival of bureaucratic hyperrationalism," Tufte says that the overwhelming levels of bulleted hierarchies, "grid prisons" surrounding spreadsheet entries, and the fact that the reasoning is broken up into "stupefying fragments" among many slides helped obscure what the data really showed—that the tile problem could indeed cause significant heat damage (Tufte 2003).

More humorously, a somewhat notorious graphic made the rounds in 2010 as an example of a military tool that spun out of control. It showed a PowerPoint slide that was meant to portray the complexity of American military strategy, showing more than 60 color-coded "nodes" with various connections to each other. When General Stanley McChrystal, the leader of American and North Atlantic Treaty Organization (NATO) forces in Afghanistan, was shown the slide, he was reported to have quipped, "When we understand that slide, we'll have won the war" (Bumiller 2010).

Beware of unintentional bias in designing visuals. Data analytics expert Stephanie Evergreen wrote about a visualization of poverty in Minnesota, where poor people were represented as red dots. Poverty in Minnesota is closely tied with communities of color. People from these predominantly African American communities were not happy with being visualized this way, saying they felt like this represented them as an "infestation" and that they were "perceived as a threat" (Evergreen 2015). Evergreen's colleague redesigned the map, which shows poverty rates in block shapes at the census tract level, in shades of purple. This is a better solution because it aggregates the data rather than identifying individuals.

The lesson here is to realize that design can affect people's perception of the information being conveyed. If you feel that a certain graphic may be perceived differently as a result of various formats, pretest different variations of the graphic to determine to what extent the design affects audience perceptions. The goal is to design a graphic that presents risk-related information as clearly and objectively as possible. At the same time, the graphic form should portray factual

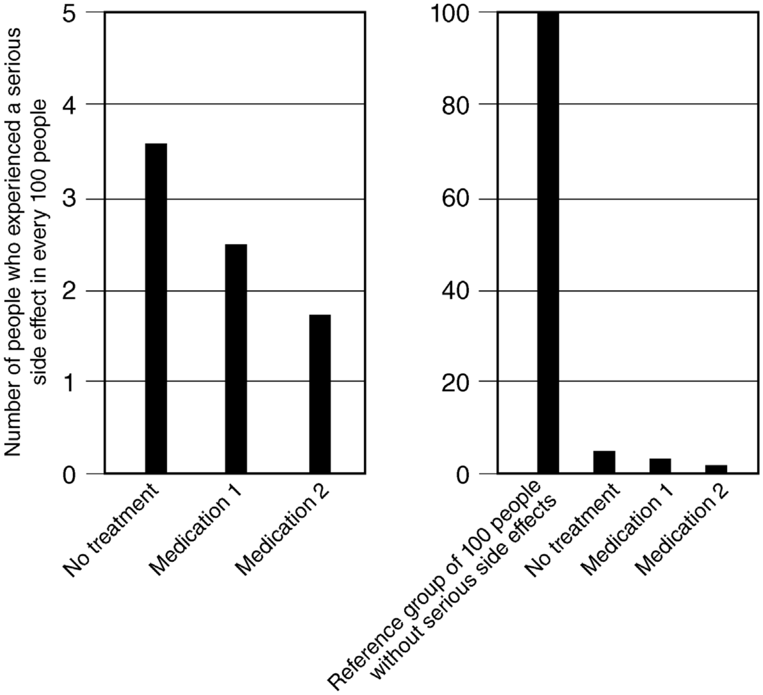


Figure 14.22. Relative versus absolute risks. The chart on the left shows relative risks only within a small group of those who had serious side effects. The chart on the right shows absolute data by including the reference group of 100 people who had no side effects. Because the left-hand chart appears to show a much greater risk reduction, it could be used deceptively to persuade people to choose medication over nontreatment.

information, such as measured quantities of contaminants, in ways that are consistently understood across your target audiences.

USING VISUAL INFORMATION IN GROUP DECISION MAKING

Showing risk information and alternatives visually can be a very powerful tool for consensus communication that involves group decision making. For example, community members may be considering installing a dam on a local river. They may wish to visualize the potential effects of the dam on the local economy, recreational use, and fish spawning habits. Viewing these effects visually can provide a common foundation for members to discuss alternatives and trade-offs.

Computer-assisted decision software systems also can be effective. With interactive computer graphics, such systems can show, sometimes in real time, the effects when certain factors are varied. For instance, using the example described earlier, with proper input data, the system could create a graph estimating the decrease or increase in the fish population with a new dam. It could chart the amount of electricity produced over time. It could show estimated costs and savings with and without the dam. (Chapter 18 gives more information on using computers for consensus communication.)

One company specializing in environmental work has had some success with a user- friendly graphic interface that allows nonspecialists to see the workings of a risk assessment computer model. The interface shows the process by which the input (factors that influence the risk, such as lifestyle habits) affects the resulting risk assessment, and by how much.

CHECKLIST FOR VISUAL REPRESENTATION OF RISK

In depicting risk-related information in visual formats:

- ☐ The target audiences and uses of graphics formats have been identified.
- ☐ Visuals have been designed to portray specific aspects of a risk.
- ☐ Visuals have been personalized to the extent possible.
- ☐ Visuals with quantitative elements remain true to the original data.
- ☐ Probability and uncertainty have been depicted appropriately.
- ☐ Graphics have been pretested and modified in response to comments.

REFERENCES

American National Standards Institute (ANSI). 2002. *Criteria for Safety Symbols, Z535-3-Revised*. National Electrical Manufacturers Association, Washington, DC.

Banda, S. F. and K. Sichilongo. 2006. "Analysis of the Level of Comprehension of Chemical Hazard Labels: A Case for Zambia." *Science of the Total Environment*, 363: 22–27.

Bord, R. J. and R. E. O'Connor. 1992. "Determinants of Risk Perceptions of a Hazardous Waste Site." *Risk Analysis*, 12: 411–416.

Brennan, E., E. K. Maloney, Y. Ophir, and J. N. Cappella. 2017. "Potential Effectiveness of Pictorial Warning Labels That Feature the Images and Personal Details of Real People." *Nicotine & Tobacco Research*, 19 (10): 1138–1148.

Britton, R. L. 1991. The Influence of Presentation Format on Interpretation of Paternity Test Results: Due Process or Deception? Unpublished master's dissertation, University of California, Irvine, California.

Broad, K., A. Leiserowitz, J. Weinkle, and M. Steketee. 2007. "Misinterpretations of the 'Cone of Uncertainty' in Florida During the 2004 Hurricane Season." *Bulletin of the American Meteorological Society*, 88 (5): 651–667.

Bumiller, E. 2010. "We Have Met the Enemy and He Is PowerPoint." The New York Times, April 26. http://www.nytimes.com/2010/04/27/world/27powerpoint.html?_r=1&ref=technology (accessed October 16, 2017).

Carnegie-Mellon University. 1995. *Fields from Electric Power*. Department of Engineering and Public Policy, Pittsburgh, Pennsylvania.

U.S. Environmental Protection Agency, U.S. Department of Health and Human Services, and U.S. Public Health Service. 1992. *A Citizen's Guide to Radon: The Guide to Protecting Yourself and Your Family from Radon*, 2nd edition. U.S. Government Printing Office, Washington, DC.

Evergreen, S. D. H. 2015. "How Dataviz Can Unintentionally Perpetuate Inequality: The Bleeding Infestation Example." Blog of Evergreen Data, October 7. http://stephanieevergreen.com/dataviz-inequality_pt1/ (accessed September 17, 2017).

Fischhoff, B., N. T. Brewer, and J. S. Downs, eds. 2011. Communicating Risks and Benefits: An Evidence-Based User's Guide. Food and Drug Administration, U.S. Department of Health and Human Services, Silver Spring, Maryland. http://www.fda.gov/downloads/AboutFDA/ReportsManualsForms/Reports/UCM268069.pdf (accessed October 16, 2017).

Fortin, J. M., L. K. Hirota, B. E. Bond, A. M. O'Connor, and N. F. Col. 2001. "Identifying Patient Preferences for Communicating Risk Estimates: A Descriptive Pilot Study." *BMC Medical Informatics and Decision Making*, 1: 2. https://bmcmedinformdecismak.biomedcentral.com/articles/10.1186/1472-6947-1-2 (accessed October 16, 2017).

Geiger, C. J., B. W. Wise, C. R. M. Parent, and R. G. Hanson. 1991. "Review of Nutrition Labeling Formats." *Journal of the American Dietetic Association*, 91 (7): 808–815.

Gigerenzer, G. and A. Edwards. 2003. "Simple Tools for Understanding Risks: From Innumeracy to Insight." *British Medical Journal*, 327: 741–744. http://bmj.bmjjournals.com/cgi/content/full/327/7417/741#REF21 (accessed October 16, 2017).

Goldsworthy, R. C., N. C. Schwartz, and C. B. Mayhorn. 2008. "Interpretation of Pharmaceutical Warnings Among Adolescents." *Journal of Adolescent Health*, 42 (6): 617–625.

Goodyear-Smith, F., B. Arroll, L. Chan, R. Jackson, S. Wells, and T. Kenealy. 2008. "Patients Prefer Pictures to Numbers to Express Cardiovascular Benefit from Treatment." *Annals of Family Medicine*, 6: 213–217.

Graber, D. 1990. "Seeing Is Remembering: How Visuals Contribute to Learning from Television News." *Journal of Communication*, 40: 134–155.

Hager, P. J. and H. J. Scheiber. 1997. *Designing and Delivering Scientific, Technical, and Managerial Presentations*. John Wiley & Sons, Inc., New York.

Halpern, D. F., S. Blackman, and B. Salzman. 1989. "Using Statistical Risk Information to Assess Oral Contraceptive Safety." *Applied Cognitive Psychology*, 3: 251–260.

Hammond, D., G. T. Fong, R. Borland, K. M. Cummings, A. McNeill, and P. Driezen. 2007. "Text and Graphic Warnings on Cigarette Packages: Findings from the International Tobacco Control Four Country Study." *American Journal of Preventive Medicine*, 32 (3): 202–209.

Hansen, M. M. 2008. "Versatile, Immersive, Creative, and Dynamic Virtual 3-D Healthcare Learning Environments: A Review of the Literature." *Journal of Medical Internet Research*, 10 (3): e26. http://www.jmir.org/2008/3/e26 (accessed October 16, 2017).

Ibrekk, H. and M. G. Morgan. 1987. "Graphical Communication of Uncertain Quantities to Non-Technical People." *Risk Analysis*, 7: 519–529.

Johnson, B. B. and P. Slovic. 1995. "Presenting Uncertainty in Health Risk Assessment: Initial Studies of Its Effects on Risk Perception and Trust." *Risk Analysis*, 15: 485–494.

Johnson, B. B., P. M. Sandman, and P. M. Miller. 1992. "Testing the Role of Technical Information in Public Risk Perception." *Risk: Issues in Health and Safety*, 3: 341–364.

Lacerda, F. W. 1986. *Comparative Advantages of Graphic versus Numeric Representation of Quantitative Data*. Unpublished doctoral dissertation, University of Virginia Polytechnic Institute and State University, Blacksburg, Virginia.

Lang, A. 1995. "Defining Audio/Video Redundancy from a Limited-Capacity Information Processing Perspective." *Communication Research*, 22: 86–115.

Lipkus, I. M. and J. G. Hollands. 1999. "The Visual Communication of Risk." *Journal of the National Cancer Institute Monographs*, 25: 149–163.

Mayer, R. E., W. Bove, A. Bryman, R. Mars, and L. Tapangco. 1996. "When Less Is More: Meaningful Learning from Visual and Verbal Summaries of Science Textbook Lessons." *Journal of Educational Psychology*, 88: 64–73.

Morgan, M. G., H. K. Florig, I. Nair, C. Cortes, K. Marsh, and K. Pavlosky. 1990. "Lay Understanding of Low-Frequency Electric and Magnetic Fields." *Bioelectromagnetics*, 11: 313–335.

Orcutt, J. D. and J. B. Turner. 1993. "Shocking Numbers and Graphic Accounts: Quantified Images of Drug Problems in the Print Media." *Social Problems*, 40: 190–206.

Pacific Northwest National Laboratory. 1994. Summary: Environmental Report 1993. Prepared for the U.S. Department of Energy, Richland, Washington.

Pacific Northwest National Laboratory. 1995. Hanford: Your Environment and Your Health. Prepared for the U.S. Department of Energy, Richland, Washington.

Paivio, A. 1978. "Mental Comparisons Involving Abstract Attributes." *Memory and Cognition*, 6 (3): 199–208.

Pighin, S., J.-F. Bonnefon, and L. Savadori. 2011. "Overcoming Number Numbness in Prenatal Risk Communication." *Prenatal Diagnosis*, 31: 809–813.

Presidential/Congressional Commission on Risk Assessment and Risk Management. 1997. Risk Assessment and Risk Management in Regulatory Decision-Making. Final Report, Volume 2, Washington, DC.

Sandman, P. M., N. D. Weinstein, and P. Miller. 1994. "High Risk or Low: How Location on a 'Risk Ladder' Affects Perceived Risk." *Risk Analysis*, 14 (1): 35–45.

Schapira, M. M., A. B. Nattinger, and C. A. McHorney. 2001. "Frequency or Probability? A Qualitative Study of Risk Communication Formats Used in Health Care." *Medical Decision Making*, 21: 459–467.

Schapira, M. M., A. B. Nattinger, and T. L. McAuliffe. 2006. "The Influence of Graphic Format on Breast Cancer Risk Communication." *Journal of Health Communication*, 11 (6): 569–582.

Shepard, R. N. 1967. "Recognition Memory for Words, Sentences, and Pictures." *Journal of Verbal Learning and Verbal Behavior*, 6: 156–163.

Slovic, P. 1987. "Perception of Risk." *Science*, 236: 280–285.

St. Clair, R. A. 1956. Presenting School Safety Facts: A Format for Graphic Presentation of Accident Data in the Annual Safety Report. Unpublished thesis, Stout State College, Menomonie, Wisconsin.

Technical Steering Panel. 1990. *Initial Hanford Radiation Dose Estimates*. Washington Department of Ecology, Office of Nuclear and Mixed Waste, Olympia, Washington.

Tufte, E. R. 1983. *The Visual Display of Quantitative Information*. Graphics Press, Cheshire, Connecticut.

Tufte, E. R. 1990. *Envisioning Information*. Graphics Press, Cheshire, Connecticut.

Tufte, E. R. 1997. *Visual Explanations: Images and Quantities, Evidence and Narrative*. Graphics Press, Cheshire, Connecticut.

Tufte, E. R. 2003. *The Cognitive Style of PowerPoint*. Graphics Press, Cheshire, Connecticut.

University of Rochester School of Medicine and Dentistry. 2001. Clear Horizons: A Quit Smoking Guide Especially for Those 50 and Over. The Smoking Research Program, James P. Wilmot Cancer Center and Department of Community and Preventive Medicine, Rochester, New York.

Viscusi, W. K., W. A. Magat, and J. Huber. 1991. “Communication of Ambiguous Risk Information.” *Theory and Decision*, 31: 159–173.

Wallack, L., L. Dorfman, D. Jernigan, and M. Themba. 1993. *Media Advocacy and Public Health: Power for Prevention*. Sage Publications, Newbury Park, California.

Weinstein, N. D., P. M. Sandman, and N. E. Roberts. 1989. *Communicating Effectively about Risk Magnitudes*, EPA 230/08-89-064. U.S. Environmental Protection Agency, Office of Policy Planning and Evaluation, Washington, DC.

Weinstein, N. D., P. M. Sandman, and W. K. Hallman. 1994. “Testing a Visual Display to Explain Small Probabilities.” *Risk Analysis*, 14: 895–896.

Zikmund-Fisher, B. J., P. A. Ubel, D. M. Smith, H. A. Derry, J. B. McClure, A. Start, R. K. Pitsch, and A. Fagerlin. 2008. “Communicating Side Effect Risks in a Tamoxifen Prophylaxis Decision Aid: The Debiasing Influence of Pictographs.” *Patient Education and Counseling*, 73 (2): 209–214.

Zikmund-Fisher, B. J., M. Dickson, and H. O. Witteman. 2011. “Cool but Counterproductive: Interactive, Web-Based Risk Communications Can Backfire.” *Journal of Medical Internet Research*, 13 (3): e60. http://www.jmir.org/2011/3/e60 (accessed October 16, 2017).

ADDITIONAL RESOURCES

Covello, V. T., P. M. Sandman, and P. Slovic. 1988. *Risk Communication, Risk Statistics, and Risk Comparisons: A Manual for Plant Managers*. Chemical Manufacturers Association, Washington, DC.

Evergreen, S.D.H. 2017. *Effective Data Visualization: The Right Chart for the Right Data*. Sage Publications, Inc., Thousand Oaks, California.

Evergreen, S.D.H. 2018. *Presenting Data Effectively: Communicating Your Findings for Maximum Impact*, 2nd edition. Sage Publications, Inc., Thousand Oaks, California.

Gray, J. G., Jr. 1986. *Strategies and Skills of Technical Presentations: A Guide for Professionals in Business and Industry*. Greenwood Press, Westport, Connecticut.

Maibach, E. and R. Parrot, eds. 1995. *Designing Health Messages: Approaches from Communication Theory and Public Health Practice*. Sage Publications, Newbury Park, California.

Raines, C. 1989. *Visual Aids in Business*. Crisp Publications, Waterloo, Ontario, Canada.

Sandman, P. M. and N. D. Weinstein. 1994. *Communicating Effectively About Risk Magnitudes: Bottom Line Conclusions and Recommendations for Practitioners*, EPA-230-R-94-902. U.S. Environmental Protection Agency, Washington, DC.

Tufte, E.R. 2006. *Beautiful Evidence*. Graphics Press, Cheshire, Connecticut.

United Nations Economic Commission for Europe. “Globally Harmonized System of Classification and Labeling of Chemicals.” http://www.unece.org/trans/danger/publi/ghs/pictograms.html (accessed January 25, 2013).

Wogalter, M. S., D. M. DeJoy, and K. R. Laughery. 1999. *Warnings and Risk Communication*. Taylor & Francis, London.

15

FACE-TO-FACE COMMUNICATION

Another way to communicate risk is face to face through some form of oral presentation. Face-to-face communication includes a wide range of activities such as the following:

- One-to-one interactions (health care professional to patient, employee to employee, peer to peer, neighbor to neighbor)
- Small group settings (speaking before clubs, societies, organizations)
- Speakers bureaus
- Facility tours
- Demonstrations of activities related to preventing, analyzing, or monitoring risk
- Video presentations
- Audience interviews to elicit concerns or perceptions
- Information fairs
- Large formal learning situations (grade school to college courses, continuing education courses, training seminars)

Risk Communication: A Handbook for Communicating Environmental, Safety, and Health Risks,
Sixth Edition. Regina E. Lundgren and Andrea H. McMakin.
© 2018 The Institute of Electrical and Electronics Engineers, Inc., and Regina E. Lundgren
and Andrea H. McMakin. Published 2018 by John Wiley & Sons, Inc.

In this book, we differentiate face-to-face communication from stakeholder participation in that usually only one of the groups involved (either those who are communicating risk or the audience at risk) does most if not all of the talking (one-way communication). Formal hearings and other kinds of group interactions involving two-way communication are described in Chapter 17.

In this book, we differentiate face-to-face communication from stakeholder participation in that usually only one of the groups involved (either those who are communicating risk or the audience at risk) does most if not all of the talking (one-way communication).

The advantages and disadvantages of using face-to-face communication are discussed in Chapter 10. This chapter discusses specific aspects of constructing face-to-face messages, focusing on issues important to risk communication, and provides guidelines for specific types of face-to-face risk communication activities.

CONSTRUCTING FACE-TO-FACE MESSAGES

Many people have learned about effective ways to speak or listen to their audiences in face-to-face interactions, perhaps through such organizations as the Toastmasters International. However, for risk communication, a few points should be emphasized. Key to these points is the choice of who will lead the face-to-face interaction.

Choose the Appropriate Spokesperson

Whether the audience will be doing most of the talking (as in an audience interview) or the organization's speaker will be doing most of the talking, those who are communicating risk have several choices as to who will lead the effort. Sometimes those in charge of the risk communication program will be the spokespeople for their organization. In other cases, other managers or experts will represent the organization. In still other cases, those outside the organization will speak to the issue. How do you know when to choose a spokesperson and which kind to choose? The two key criteria in choosing a spokesperson are audience acceptability and organizational acceptability.

The two key criteria in choosing a spokesperson are audience acceptability and organizational acceptability.

Audience Acceptability

A number of factors affect whether your audience will find the spokesperson acceptable. Will they find the person credible, that is, will they believe what the person has to say? Credibility has to do with credentials related to the risk (Does the person have an advanced degree in the subject matter or many years of experience in the field?), the audience's past experience with the person or organization doing the communicating (Do they trust anyone from that organization?), and the speaker's ability to demonstrate a caring attitude. For example, in studies of public perceptions of trust and credibility in the United Kingdom, government agencies as well as government and industry scientists ranked low as sources of trusted risk information, whereas friends and family ranked high (Bennett and Calman 1999). Credibility is important regardless of whether the audience or the spokesperson will be doing most of the talking. (See Chapter 5 for additional information on choosing a spokesperson.)

Another factor is authority. Is the person able to respond to their concerns? This issue is particularly important in settings where the audience will be able to ask questions. If their concerns are largely technical, a scientist or an engineer is best. If they have management concerns, a manager with accountability for decision making is best. Using multiple experts can be effective if the room is arranged to allow them to interact with each other, and the audience (for example, by sitting at curved or circular tables) and the experts are responsive to each other. However, this approach can fail if audiences see it as the organization's attempt to "gang up on them" or perceive that the experts are arguing with each other. For example, researchers reviewing literature associated with the public's response to warnings of a nuclear power plant accident found that people liked hearing from more than one person to validate the information and to increase confidence in its accuracy. Consistency among the messages, however, was the key to the audience's ability to find the information credible (Mileti and Peek 2000).

Another factor to consider is whether the person can speak in a way that the audience will find acceptable. As noted later in this chapter in the guidelines section, the most appropriate leader of the interaction (regardless of who will be doing most of the speaking) will be one who can speak in the language of the audience. This ability includes the ability to speak in languages other than English if that is preferred by the audience as well as the ability to find innovative ways to describe highly technical information.

In addition, the spokesperson should be cognizant of nonverbal communication—for example, his or her stance, hand movements, and facial expressions. This body language can be just as important to acceptability as content and delivery of the message. For example, Vince Covello, renowned risk communication researcher and consultant, notes that in high-concern situations, audiences will take up to 75% of the message from body language, not the words. He recommends that in risk communication situations in which there is low trust in the communicating organization and high concern over the risk that speakers refrain from nodding their heads while listening to audience concerns. Instead of being perceived as active listening, this behavior is often perceived by concerned audiences as agreeing with an accusation. Researchers in Great Britain found that the audience tended to synchronize facial expressions, voices, and postures with a spokesperson during disasters, even when that person is viewed on a television or over the Internet (Bennett and Calman 1999). The spokesperson must be aware of these subtle clues to be effective in communicating risk information.

From an audience's perspective, the best spokesperson is one who is credible, responsive to concerns, and a believable speaker.

From an audience's perspective, then, the best spokesperson is one who is credible, responsive to concerns, and a believable speaker.

Organizational Acceptability

A number of factors also affect whether your organization finds the person an acceptable representative. For cases in which the audience will be doing most of the talking, is the person a good listener? Can that person sit still and note concerns even when these concerns seem to contradict scientific precepts or organizational requirements? For cases in which the spokesperson will be doing most of the talking, is the person able to make speeches? Has the person been trained in public speaking, specifically in media relations and in answering tough questions? Can the person speak earnestly? Most importantly from the organizational perspective, does the person understand the organization's rules and philosophy as well as the work that is being done in connection with the risk? Depending on your organization, a host of other factors may also affect the decision. Check with management and the public affairs office of your organization before making a choice.

Finding the Right Person

Once you know what criteria your spokesperson must meet, you can find your spokesperson in a number of places. You can choose health care professionals; recognized experts in the field, either inside or outside your organization; risk managers; line managers; public affairs staff; celebrities, or peers. Each group has its own benefits and liabilities.

Health care professionals can be extremely credible to the audience and can usually be responsive to technical concerns related to health and some environmental risks, although some see environmental risks in much the same way as do their patients. For example, risk researchers found in a large-scale study involving several major cities across the United States that physicians were the most trusted source of chemical risk information (McCallum et al. 1991). In addition, unless health care professionals are concerned with the risk themselves, either by being associated with the organization or by seeing the effects of the risk among their patients, these professionals may find themselves too busy to represent your organization. Their busy schedules especially conflict in the case of activities that require frequent interactions (such as audience interviews) or a long-term commitment (such as being the lead speaker for a speakers bureau).

Experts inside the organization will understand the risk and the organization, but they may not be credible to the audience. Experts outside the organization will probably be credible and will understand the risk, but, like the health care professionals, they may be too busy or too costly to represent your organization. Also, the very act of your employing them may make them less credible in your audience's eyes. In addition, they may not understand organizational concerns.

Risk and line managers understand the risk and the organization. They will be able to address at least some of the audience's concerns. However, they may not be credible to the audience. For situations in which the audience will be doing most of the talking (such as audience interviews), they may be unable to separate themselves from the risk assessment process or organizational needs to listen without trying to correct misperceptions.

Public affairs staff will understand organizational concerns and, depending on the person and the level of technical understanding, may be able to discuss the scientific aspects of the risk. However, in many cases, they will have no credibility in the eyes of a hostile audience because of the unfortunate stereotype of the public affairs person as the manipulative Madison Avenue type. The expertise of public affairs staff in making speeches is often best used to facilitate meetings and presentations, and to coach speakers.

Celebrity spokespersons have been used in care communication situations as well as to lobby for a certain constituency in consensus communication. Celebrities generally neither understand the organization nor the risk, and they may not be particularly credible to the audience, unless they can make some claim to have experienced the risk firsthand. If they do not have such a motivation as having experienced the risk (and hence are willing to donate their time to promote its prevention or mitigation), they can be very expensive to hire. However, their high-visibility position can serve to create awareness of a particular risk and even perhaps to motivate an audience to action. An example of this power is when NBC television personality Katie Couric underwent a colonoscopy live on national TV in 2000. Colonoscopy rates across the United State jumped more than 20% following her examination, a phenomenon that became known as "the Katie Couric effect."

Peers can be trusted community members or colleagues with a stake in the hazard. The audience may trust their advice over that of experts, risk managers, or public affairs staff. They may need training in specific aspects of the risk and the risk communication plan to effectively communicate and encourage behavior changes. For example, the Sierra Leone Disaster Management Department recruited hundreds of volunteers to speak face-to-face, one-on-one, with 100,000 households to spread the word about the Ebola virus (Massaquoi 2014).

Table 5.3 in Chapter 5 provides additional information on choosing the appropriate spokesperson.

Give the Audience Something to Take Away

One of the drawbacks of face-to-face communication is that, unless the members of your audience are good at taking notes, they will have nothing to take away from the presentation to help them remember key points. Even though some people learn by listening, most need visual reinforcement. Unless you reinforce the presentation with written materials such as fact sheets (one-page handouts that emphasize key points), the audience may not take away, or retain, the information you intended.

> Unless you reinforce the presentation with written materials, the audience may not take away, or retain, the information you intended.

Reinforce Your Message with Visual Aids

Whenever possible, include visual aids as part of the face-to-face interaction. These visuals must be readable from the back of the room in group settings and readable at arm's length for more intimate settings. Regardless of expert design, creative use of color, and clever wording, your visuals are useless if they must be prefaced by the apology, "Now, I know you probably can't see this, but what it shows is . . . ." Use words or short phrases to emphasize key points and to show the audience how concepts fit together. Use photographs, drawings, and graphs to further illustrate key ideas. See Chapter 14 for additional information on using visual representations of risk.

Speak in the Language of the Audience

The speaker should use words and phrases that the audience will understand. At a public meeting concerning the siting of a proposed wind energy farm, the spokesperson for the organization proposing the farm had obviously gone to great trouble to develop slides and an oral presentation that would present the facts to his audience. Unfortunately, when it came to describing the design of the farm, a factor that concerned audience members, he described heights and distances in "rotor diameters." In one of his opening remarks, he had stated that a rotor diameter was so many feet; however, it was rather unrealistic to expect that his audience (1) would have taken note of that fact, which concerned a foreign concept to begin with; (2) would remember the fact until he began using it again; and (3) would be able to do the math in their heads. It would have been far simpler for everyone if he had given the distances in feet. As it was, his audience became more and more hostile with each mention of the term, until it became obvious to even the spokesperson that many of them were no longer listening.

Whenever possible, the speaker should speak in the language of the audience. If the audience speaks a nonstandard English, however, by all means have the speaker use standard English. Your message will not be credible if they feel you are trying to speak down to them. If English is not the audience's main language, as is the case in many Latino neighborhoods, for example, find a spokesperson (yourself or someone else who is credible) who can speak in the primary language.

Do Not Promise What You Cannot Deliver

When you as a speaker get a question from your audience that you cannot answer, offer to get back to them with an answer only if you can realistically find that answer. "I don't know, but I'll find out" is a good response to unfamiliar questions. However, too often, speakers promise information that they will not be able to access or that they forget is classified or proprietary. As you try to respond to your audience, it is easy to promise to give information, knowing that you personally probably will not be held to task later by the often unknown audience member. However, that audience member will remember the lapse and let others know that your organization failed to live up to a promise, eroding your credibility. If you do make a promise for information, find out how to contact the person who wanted the information and make it a point to get back to them within 1 or 2 days.

Be careful, too, that you do not promise something that your organization is unable to give. For example, if the request from the audience is to hold more public meetings, and you gladly agree without checking whether your organization has the time or resources needed, you may not be able to keep your promise. Breaking such promises, as you can imagine, is a sure way to increase audience hostility toward the organization and to erode credibility.

GUIDELINES FOR SPECIFIC TYPES OF FACE-TO-FACE COMMUNICATION

The following information is provided for specific types of face-to-face risk communication activities.

Speaking Engagements

Speaking engagements are one of the most common forms of face-to-face risk communication. To ensure that the audience understands the message being delivered, consider the following guidelines:

- **Coach staff with little speaking experience.** Sometimes the spokesperson who will best meet both audience and organizational needs happens to have little or no speaking experience. Such people need coaching to be effective. Simply writing a script for them generally does not work. Those words came from someone else, and the neophyte speaker will probably not be comfortable with them. In addition, repeating someone else's ideas will not help them when they get unanticipated questions from the audience. It is, therefore, best to train the spokesperson in how to be an effective speaker. Courses like those offered by the Dale Carnegie Foundation or Toastmasters can be extremely helpful in getting novice speakers over the fear of facing an audience. In-house courses offered by knowledgeable communicators are also helpful because they can be tailored to specific situations and organizational needs. The speaker should also be prepared with information on how to deal with hostile audiences, working with the news media if that is expected, and the basic principles of risk communication.

- **Practice the presentation.** Even an experienced speaker should practice the presentation if at all possible. Use similar lighting, acoustics, and room size. Include in the practice audience people who will listen for technical details, audience concerns, and legal issues. Have the practice audience listen for content, and watch body language. One speaker had a tendency to push up his glasses with his middle finger while speaking. When he was told to practice in front of a mirror, he saw the gesture and easily remembered not to use it, for fear of offending his audience.
- **Practice answering questions as well.** Using the information you gleaned from the audience analysis, anticipate what questions might be raised. Answer as many questions as possible in the presentation itself. If the audience might want additional details, develop appropriate answers and have them ready if the audience asks for them. Have the practice audience ask questions. Also practice dealing with hostility and the news media (see Chapter 16).
- **Strive for an accessible, comfortable setting.** These points are particularly important to the credibility of a risk communication presentation. The setting or place of the face-to-face interaction should be accessible to the audience and comfortable for them. This means that the setting should be in a neutral location, one that does not evoke negative feelings. For example, a federal agency in our home state holds all its public meetings in its own auditorium, which is a nice facility with good lighting and fairly comfortable seats. However, the facility can be used in only one configuration: a raised stage at one end and theater-style seating that encourages an "us versus them" perception. This design, and the fact that the agency often comes under fire for its decisions at these meetings, make other facilities more appropriate.
- **Dress to suit the setting.** For a formal presentation before the city's business leaders, a business suit would be appropriate. For a speech at a lodge picnic, more casual attire is warranted. Speakers should not try to dress exactly like the audience unless it is the way he or she normally dresses. Audiences generally react more favorably to speakers who are being genuine than to ones who are attempting to be someone they are not.

- **Consider acoustics and lighting.** Make sure that the acoustics and lighting are adequate for the kind of presentation planned. Make sure that the speaker can be heard to the back of the audience. If the speaker will need a microphone, make sure that he or she knows how to use it and has the controls within reach. If the speaker is using a projected presentation as a visual aid, make sure that the lights can be dimmed so that the audience can see it and still see each other and the speaker. A completely darkened room can be a safety hazard and can also encourage some members of the audience to fall asleep. Also make sure that the speaker or an associate can reach the dimmer switch in mid-presentation if need be. That way, the lighting can be easily increased to see who just asked a question.
- **Know your equipment.** For a presentation using a projector, a flip chart, or any other kind of visual aid, make sure that the speaker knows the location of any associated equipment and how to make it work. Have a backup plan if the equipment doesn't work. Also make sure that someone is available who knows how to work the heating, ventilation, and air-conditioning system. Tempers in even the most moderate audience will flare if the room is too hot or too cold.

Speakers Bureaus

Instead of waiting to be asked to make presentations, many organizations in charge of risk communication efforts have developed a speakers bureau, a group of speakers known for their expertise in a given subject who can be contacted to give free or low-cost speeches for local communities and organizations. The speakers can all belong to a given organization, or they may be experts that the organization has contracted to provide the service. When developing a speakers bureau for the purpose of communicating about risks, consider the following:

- **Choose speakers who will be credible with a wide range of potential audiences.** The experts in your bureau must be able to speak before virtually any stakeholder group who might request a presentation. Therefore, it is necessary to select speakers who will be credible to the widest possible audience. Depending on your audience's needs, such speakers might include health care professionals, scientists, engineers, regulators, risk managers, or college or university staff.
- **Ensure that the speakers have been appropriately trained.** The speakers who make up the bureau will by necessity be experts in their fields. They will, however, most likely need additional training in appropriate risk communication principles and techniques as well as the risk communication effort they are supporting.
- **If possible, develop consistent materials to support their presentations.** As with the speaking engagement described earlier in this chapter, ensure that

your speakers go out armed with appropriate information materials to leave with their audiences and that their visual aids are appropriate to the situation. If, however, your intended audience is highly hostile to the organization in charge of communicating the risk, avoid providing materials that publicize the organization. Your speakers may be more credible, and the risk message is more likely to be received, if there is some perceived distance between the speaker and the organization.

Tours and Demonstrations

Tours and demonstrations are another way to communicate risk in face-to-face interactions. In a tour, some segment of the audience is invited to view a facility or site that is perceived as contributing to a risk. In a demonstration, the audience views or participates in an activity designed to assess, prevent, monitor, or mitigate a risk. Regardless of the form, several guidelines can be applied:

- **Make sure that tours and demonstrations are open.** Do not exclude some segment of your audience. Hold the tours and demonstrations at times when it is possible for the audience to attend. For example, if many members of your audience work full time, plan the tour or demonstration before or after their work hours or on weekends.
- **Make sure that tours and demonstrations are easily accessible to all members of your audience.** For example, have wheelchairs and make sure that elevators are available to take them between floors. Have someone fluent in sign language available to assist the hearing impaired. Make sure that people know in advance what kind of footwear and/or clothing to wear if that is important. Tell your audience how much walking is involved and in what kind of situations so they can be prepared.
- **Be as careful in choosing a tour or demonstration leader as you would someone who is giving an oral presentation.** Make sure that the person is acceptable to both your audience and your organization, can answer audience concerns and questions, and is able to speak at your audience's level.
- **Determine what you hope to gain by the tour.** Are you trying to persuade your audience that what you are doing is perfectly safe? (See Chapter 5 for the dangers in using persuasion.) Are you trying to raise awareness of an issue? Are you trying to give your audience information on which to base some decision? Make sure that the tour or demonstration reinforces the purpose and does not detract from it.
- **Consider organizational and audience needs.** Make sure that what you are going to show your audience does not compromise proprietary or classified information and that the information you are presenting meets your audience's needs. For example, if what your audience really wants to know is how your organization trains its workers, showing them the

beautifully landscaped grounds will not meet their needs and may make them angry. A manager at a hazardous waste incinerator took the local garden club on a tour of the plant. One of the women asked him just how dangerous the smoke she saw coming out of a stack was to breathe. The manager, acting in an unfortunately patronizing fashion, told her not to worry about it, that it was no more dangerous than eating a peanut butter sandwich. She hit him with her purse. Consider your audience carefully, listen to their questions, probe for underlying concerns, and answer questions honestly and courteously.

- **Practice the tour and demonstration.** Practice what the tour leader will say and how the tour or demonstration will be given. Have the practice audience listen as outsiders would. Sometimes, concepts that seem clear from within the organization can seem foreign or can be totally misconstrued by your audience. A chemical manufacturing plant had been criticized for failing to take safety issues seriously, despite an excellent safety record, well-documented and applied procedures, and a well-trained workforce. Managers opened the plant to a particularly vocal activist group and carefully explained all the precautions that had been taken. After the tour, the leader of the activist group reported to the press waiting outside the gates, “Well, now we know there’s something really unsafe. Look at all the attention they’re paying to safety!” Analyze your audience carefully in developing your tour or demonstration.

Video Presentations

Video combines many of the features of information materials and face-to-face communication. It can be used in a variety of situations such as formal learning environments or in-home study. A video can carry more information than some other more visual forms of risk communication such as posters or displays, but the narration of the video adds a dimension of human contact like an oral presentation. Therefore, the content of a video should follow the general guidelines for constructing information materials. The delivery, as in the spokesperson and visual aids, should follow the general guidelines for constructing face-to-face messages.

Professional video can be expensive to produce—up to several thousand dollars per minute of finished footage for high-end productions. However, cell phones are available that can be used to develop simple videos relatively cost-effectively, depending on your purpose and objectives and your audience’s needs. Either way, you should have a very specific purpose for the video that cannot be accomplished otherwise (for example, depicting a hazardous situation that would be unsafe to show people directly). This reason should include movement; if you do not need to show movement, you can get a similar affect through a presentation with still photography.

Give your video as long a shelf life as possible by writing the script in ways that do not make your content out of date next week. Focus on longer term, enduring issues related to your risk so that the video can be used in a variety of situations.

Use experienced script writers and videographers. Remember that videos are like television; audiences focus more on (and remember) what is shown than what is said. Make the script and visuals flow together for greater impact.

For successful risk communication videos, always consider the needs of your audience:

- **How will the video be distributed?** It's a good idea to make your video available on YouTube or on your website for mass distribution. You can include the video link in your other communication channels such as social media. You may ask other organization to point appropriate audiences to your video, such as health care professionals, the school system, or professional organizations.
- **Where will the video be shown?** Just as important as distribution is the setting in which the video will be shown. If the video will be used as part of a formal learning environment (public school system, college, or organization training course), it will need to complement other materials and information such as learning objectives, student workbooks, and tests. If the video will be shown as part of an oral presentation, the speech and other materials should likewise be complementary. If the video will be accessed in a home environment, on the other hand, it will need to be more self-contained and more comprehensive.
- **Will there be a spokesperson present to answer questions?** The chief disadvantage of a video as a form of face-to-face communication is that, unless a spokesperson is present at the showing, there is no opportunity for the audience to ask questions. If the video will always be used with a spokesperson present, it may not have to be as comprehensive as a video that will be used without a spokesperson present.

One other factor to consider in video production particularly is the quality of the video. Again, consider your audience. Although high-caliber video production companies are generally available to produce videos that rival some of Hollywood's most impressive films in the areas of special effects and acting ability, such a high-gloss production may in fact alienate some audiences, particularly those who might be hostile to the organization producing the video. Such audiences will see a high-quality video production as a Madison Avenue cover-up. Also, some audiences still equate videos with high price tags, although, in fact, the price has fallen considerably with the advances in technology. Such audiences will also be alienated by high-end videos, especially when produced by a government organization with taxpayer funding. In these cases, it may be better to opt for a more simple production or to use another method to communicate about risk.

Case Study: Participatory Techniques Can Evoke Emotions, Engagement

How do you get at-risk communities to grasp the urgency of potential volcano eruptions—when many residents have never seen an eruption and aren't particularly concerned about the consequences?

In this care communication example, a research team conducted a video campaign, using participatory techniques, with two volcanically active communities in Colombia and in the Caribbean island of St. Vincent (Hicks et al. 2017). The goal was to raise risk awareness and motivate residents to take actions before and during an eruption—such as practicing evacuation and knowing how to get to higher ground during a real emergency.

To evoke emotion and engagement, especially among skeptics in the communities, the team deliberately chose video to show past eruptions and their disastrous consequences. In field research to understand their audience, the team heard from those who had lived through previous eruptions and could speak firsthand about the devastation. The team created a partnership with local volcano monitoring scientists and at-risk populations, who became the leading focus in the video (Figure 15.1).

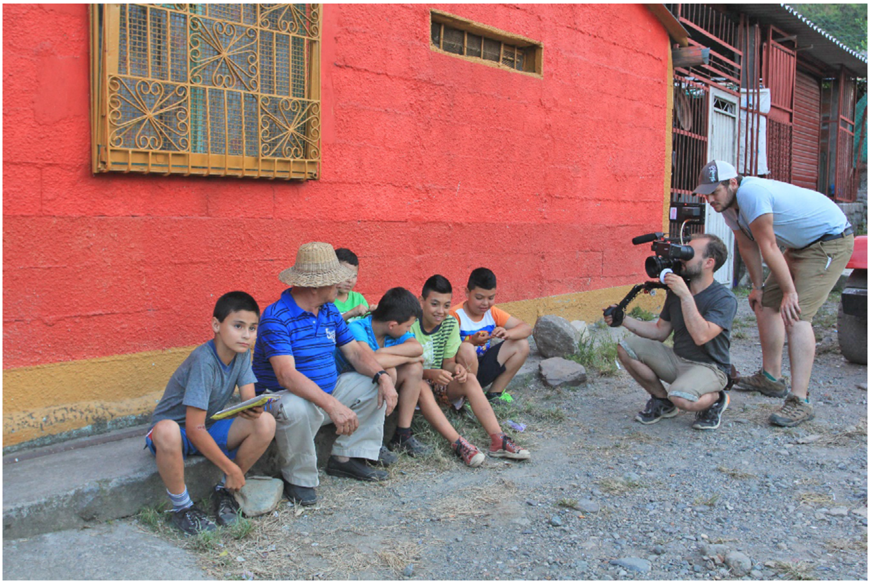


Figure 15.1. A film crew recording the stories of people impacted by the volcanic eruption of Nevado del Ruiz, Colombia. (Source: Anna Hicks, STREVA Project©, used with permission).

One woman remembered her response in 1985 when Red Cross officials told them an avalanche was coming, "We thought they were crazy, or joking." One woman who was schoolgirl at the time said, "We started playing with the ash because we didn't know the magnitude of what was going to happen." Once the eruption progressed, one man talked about being caught in a powerful avalanche of mud, and trying to breathe, which was like "being in one of those machines that process rice." Others talked about family members being swept away, trees that had been torn out by the roots, and buildings demolished. The video ends with residents cautioning others not to forget, and to take risk management seriously.

The videos were shared and discussed with at-risk communities. Evaluation results showed that residents appreciated the use of local content and recognizable community members who shared their experiences and taught valuable lessons. Audiences were motivated to consider "owning" the risk and thinking about actions to reduce risk and strengthen resilience.

This study demonstrated the effectiveness of working collaboratively with local communities to spark engagement and behavior regarding a potential risk that has serious consequences.

Audience Interviews

Interviewing the audience to understand their concerns and perceptions can be an effective form of face-to-face interaction in that it provides those who are communicating risk the opportunity to better understand their audience, and it provides the audience with the opportunity to share their concerns. Audience interviews can be a particularly effective way to begin consensus communication efforts.

An audience interview is similar to conducting a survey, but the questions should be more open ended. For example, a survey question concerning the audience's perception of home pesticide use might ask the person to rank pest control methods against others on a quantitative scale. In an audience interview, the spokesperson for the organization communicating risk might simply request, "Tell me how you control pests." Like surveys, however, the order of the questions, and the manner in which they are asked, will have a profound effect on the answers given. In general, move from the general to the specific, from topics that are positive or neutral in perception to those that are more likely to be received with hostility or some other negative reaction.

Other guidelines on audience interviews include the following:

- **Be inclusive.** Try to ensure that you are interviewing the full range of your audience. One way to do this is to start with a known list of possible interviewees and, as the final question in each interview, ask if there is anyone else who should be interviewed. The first few interviews will provide a wealth of new names, but gradually you will begin to see the same names coming up again and again. This is a sign that you have reached a good majority of your intended audience. Another approach is to use focus groups (see Chapter 17 for additional information).
- **Make your audience comfortable.** Make sure that the place for the interview is one that is comfortable for each interviewee. It is usually best to conduct each interview separately, in the interviewee's home or location of their choice. Dress casually, but professionally. Let them do most of the talking.

- **Explain the process before starting the interview.** Help them understand why you are conducting the interview, how the results will be used, and how they will know that their concerns have been heard. Ask permission before recording the interview, taking notes, or otherwise visibly capturing the information from the interview. If possible, give them the opportunity to see and correct anything you record regarding their concerns or perceptions.
- **Consider carefully before correcting apparent misconceptions or misperceptions.** It can be very tempting to jump in and correct a misconception or argue over a perception, particularly in cases in which the interviewee is clearly upset about the issue. Correcting the person you are talking with after they make a statement may anger or embarrass them. Either way, they may not want to speak candidly. They may even want to stop the interview. In addition, such correction can be a form of persuasion. Review the information in Chapter 5 on the use of persuasion before interviews and decide how you will handle such situations should they arise.

Information Fairs

An information fair is a grouping of tables or booths staffed by organizations charged with communicating a particular risk or set of risks. Those interested in the risk can circulate through the fair and choose to talk to or select information materials from various organizations of interest to them. These organizations may also put on demonstrations of how risks can be prevented, analyzed, or monitored. The fair can be for employees of a given organization (for safety and health care communication) or for a local community (for environmental, safety, or health care communication or the planning stages of crisis communication). The fair can also be used to provide information to start a consensus communication effort.

Information fairs are another hybrid of information material and face-to-face interaction. Use the guidelines on information materials in Chapter 13 and the guidelines in this chapter on selecting the appropriate spokesperson and tours and demonstrations to ensure successful fairs.

Training

As mentioned in Chapter 3, the Occupational Safety and Health Act requires that employees be trained in the use of hazardous materials associated with their jobs. Training can also be used to teach concepts related to other forms of risk and to build a crisis response unit.

Developing effective training materials is a science unto itself. The primary considerations are the audience, the purpose of the training, and the resources available, including time. For example, the type of presentation and amount of material you can cover will differ greatly between the training of a group of clerical staff on ergonomic issues in the office at a 1-hour lunch meeting and the training of a group of firefighters on hazardous materials in the community at a weeklong retreat. In general, consider these guidelines:

- **Visual is always better than oral, and hands-on is always better than visual.** There is an old teaching adage, "I hear and I forget, I see and I remember, I do and I understand." Given audience, purpose, and resource constraints, try to provide opportunities for those being trained to experience the risk in question. For example, one instructor of basic radiation safety at a nuclear facility brings in a variety of items such as a smoke detector, gas-lantern mantle, and pottery as well as a radiation detector to allow his students the chance to determine for themselves what is radioactive in their world.
- **Focus your training.** Articulate clearly what you want the students to gain from attending the training and how you will provide that information. Too often, training related to preventing, managing, analyzing, or monitoring a risk fails because the content of the course is too broad. Better to ensure that your students learn a few key concepts than to try to cram the equivalent of an advanced degree into a weeklong course.
- **Do not attempt training for a hostile audience.** If your intended audience is highly hostile toward the organization in charge of communicating the risk or the risk in general, training is not your best option to communicate risk. Start by understanding and dealing with the source of the hostility.

Chapter 18 has additional information on computer-based training.

CHECKLIST FOR FACE-TO-FACE COMMUNICATION

The spokesperson communicating the risk or leading the interaction:

☐ Is acceptable to both the audience and the organization
☐ Has written material that the audience can take away to supplement the oral presentation
☐ Has visuals that are easy for the audience to read and understand
☐ Speaks in the language of the audience
☐ Will not promise information or changes in policy unless these can be delivered
☐ Has been coached if inexperienced
☐ Has practiced:
    ☐ The presentation
    ☐ Answering questions
    ☐ Dealing with the media
    ☐ Dealing with hostility in the audience

☐ Will be presenting in a neutral setting
☐ Is dressed appropriately for the setting
☐ Can be heard to the back of the audience
☐ Knows how to work the microphone
☐ Can reach the dimmer switch if needed
☐ Knows how to work the visual aid equipment and has spare parts in case they are needed
☐ Knows who to contact to run the heating, ventilation, and air-conditioning system

The organization's speakers bureau:

☐ Uses speakers who are credible with the audience
☐ Has trained speakers in risk communication
☐ Is armed with consistent messages

Tours and demonstrations:

☐ Are scheduled at convenient times for the audience
☐ Are accessible to the audience
☐ Have appropriate spokespersons
☐ Have clear goals
☐ Consider audience and organization needs
☐ Have been practiced

Video presentations:

☐ Follow general guidelines for information materials as well as selecting spokespersons
☐ Have known distribution networks to reach the audience
☐ Have supplemental materials to support the setting in which they will be shown
☐ Are comprehensive enough to stand on their own should a spokesperson be absent at a showing
☐ Have quality appropriate to meet audience expectations Audience interviews:
☐ Cover a wide range of audience perspectives
☐ Are held in settings comfortable for the audience
☐ Begin with an explanation of process
☐ Were preplanned to include how to deal with misperceptions or inaccuracies

Information fairs:

☐ Follow the general guidelines for information materials and choice of spokesperson
☐ Follow the general guidelines for tours and demonstrations Training:
☐ Emphasizes hands-on or visual communication methods
☐ Is focused
☐ Will be given to a receptive audience

REFERENCES

Bennett, P. and K. Calman. 1999. *Risk Communication and Public Health*. Oxford University Press, New York.

Hicks, A., M.T. Armijos, J. Barclay, J. Stone, R. Robertson, and G. P. Cortes. 2017. "Risk Communication Films: Process, Product and Potential for Improving Preparedness and Behaviour Change." *International Journal of Disaster Risk Reduction* 23: 138–151.

Massaquoi, M. 2014. "ONS Targets 1M People in Door-to-Door Ebola Campaign." *Concord Times*, December 2. http://slconcordtimes.com/ons-targets-1m-people-in-door-to-door-ebola-campaign/ (accessed September 12, 2017).

McCallum, D. B., S. L. Hammond, and V. T. Covello. 1991. "Communicating about Environmental Risks: How the Public Uses and Perceives Information Sources." *Health Education Quarterly*, 18 (3): 349–361.

Mileti, D. S. and L. Peek. 2000. "The Social Psychology of Public Response to Warnings of a Nuclear Power Plant Accident." *Journal of Hazardous Materials*, 75 (2000): 181–194.

ADDITIONAL RESOURCE

Peters, R. G., V. T. Covello, and D. B. McCallum. 1997. "The Determinants of Trust and Credibility in Environmental Risk Communication: An Empirical Study." *Risk Analysis*, 17 (1): 43–54.

16

NEWS MEDIA

In this book, the term news media encompasses television, newspapers, radio, magazines, online news sites (including topic-specific blogs), and news apps. Even with many people getting their news through social media, traditional news media remain important sources of information in today's society. Many people form their opinions about health, environmental, and safety risks by what they read or hear in traditional or online news outlets.

In communicating risk-related information, administrators, technical and health professionals, and communication specialists often deal with the news media as a key provider, interpreter, gatekeeper, or channel of risk related information. We have devoted a chapter to working with media representatives—reporters, journalists, editors, and producers—because of the distinct and significant role they play in communicating risk information to the public.

The use of the Internet for risk communication is described in Chapter 18. The concept of engaging journalists via social media is discussed here, but using social media to communicate risks directly is discussed in Chapter 19. Media considerations during emergencies are described in Chapter 22. The role of media in public health campaigns is covered in Chapter 24.

Risk Communication: A Handbook for Communicating Environmental, Safety, and Health Risks,
Sixth Edition. Regina E. Lundgren and Andrea H. McMakin.
© 2018 The Institute of Electrical and Electronics Engineers, Inc., and Regina E. Lundgren
and Andrea H. McMakin. Published 2018 by John Wiley & Sons, Inc.

THE ROLES OF THE NEWS MEDIA IN RISK COMMUNICATION

Media organizations, such as television producers and newspapers, can choose among several roles, or levels of participation, to address a given risk-related issue. Participation can span a wide range from least to most involvement: (1) reporting existing information, (2) influencing the way an issue is portrayed, (3) independently bringing an issue to the public's attention or restricting its coverage, and (4) proposing solutions to a risk-related decision, including taking a stand on an issue. This section describes the levels of participation a media organization can take and corresponding strategies that those who communicate risk may wish to consider. At all levels, it is important to develop and maintain productive relationships with media representatives.

> Media organizations can choose among several roles or levels of participation to address a given risk-related issue.

Many factors affect which role, or combinations of roles, media organizations take. One factor is the type of communication situation: care, consensus, or crisis.

When a crisis presents imminent danger, reporters are likely to start with reporting existing information, when the public must be alerted quickly to protect themselves. Later, media organizations may turn to a more investigative role to attempt to uncover the factors that led to the crisis. This role may involve working with official investigating organizations, citizens' groups, policy makers, and others to portray a more complete picture of the risk, its causes, and its potential solutions.

At the lowest-participation end of the scale, risk communicators may be interviewed by reporters or otherwise asked to provide information for a story. In addition, spokespeople may need to seek out media representatives to provide information on breaking news or current events. This outreach can be done through press kits, media events, press releases, and other avenues. For providing information to reporters, see the tips later in this chapter under the headings "Guidelines for Interacting with the News Media" and "Getting the Word Out."

In care communications, media organizations may choose to take an active role in illuminating and reducing a given risk such as gang-related crime, a low child-immunization rate, or a lack of adequate nutrition for seniors. In this role, media organizations often describe the negative consequences of the risk to the community and suggest ways that individuals, groups, and entire communities can act to reduce risks. This approach casts media organizations in a stakeholder role, in which they participate with others in characterizing the problem and its potential solutions. At this level of involvement, policy and technical professionals may work directly with media and other community representatives to characterize risks and their alternatives. If you are in this situation, use the appropriate guidelines later in this chapter for working with media representatives.

At the highest-involvement end of the scale, media executives occasionally feel that a particular issue is significant enough that their organizations must get more involved, sometimes to the point of going on record with a stated position. This often involves an issue that affects the community, affects many stakeholders with different opinions about the risk, and requires a consensus decision informed by many views. Examples of such consensus-required issues are whether a new federal prison should be sited in the community, whether field burning should be made more or less restrictive, whether a new dam should be built or an existing one removed, or whether two hospitals should merge services to cut costs.

Media organizations may choose to participate more strongly in such issues by taking an advocacy role. For example, editors or producers may participate in discussions with opinion leaders about the nature of the risk, its benefits and consequences, alternatives, various points of view, and potential solutions. They may even establish an editorial position and publish or air stories supporting that position. This approach generally involves editorials or similar commentary rather than news coverage. At this level of participation, media representatives such as editorial boards may work actively and regularly with other stakeholders to fully describe the nature and consequences of a particular risk and propose solutions.

At all levels of media participation, it is important to establish productive relationships with media representatives, as described later in this chapter. Good working relationships between media representatives and those who are communicating risk increase the chances for accurate, balanced coverage. For example, research at McMaster University in Hamilton, Ontario, found that media coverage of infectious diseases such as avian influenza can allow readers to gain a more accurate view of risks. However, the same study found that reporting could just as easily increase feelings of risk in the readers (Young et al. 2008). But when media organizations publish or air something you disagree with regarding a particular risk, they are more likely to listen to your concerns if you have established yourself as a credible, reasonable source.

News Media Contrasted with Other Stakeholders

Two broad characteristics distinguish media representatives from other stakeholders and limit involvement. The first is mission. A media organization’s primary purpose is to provide the public with current information, often a combination of news and entertainment. This mission takes priority over involvement in a given risk-related issue. Other participants such as a citizens’ group may be held responsible for crafting workable solutions, hammering out a myriad of details in agreements, and even implementing the agreements and evaluating their outcomes. Media organizations are there primarily to report on and illuminate issues. Though media involvement can be a very powerful voice in the ultimate outcome of risk issues, media organizations’ responsibility in a decision-making process usually does not extend past proposing solutions.

The second characteristic that distinguishes media representatives from other stake holders is one of position and representation. Nonmedia stakeholders participating in a risk-related group decision process often represent the views of a specific constituency such as health professionals, homeowners, or recreational enthusiasts. In group discussions, these members reflect the values and judgments of those whose views they represent.

Reporters and journalists, in contrast, generally aim for objectivity and balance in their stories. Thus media representatives typically are hesitant to become directly involved in an issue, viewing such involvement as a professional conflict that could subject them to allegations of bias. In fact, the U.S. Supreme Court ruled in 1997 that a Washington State newspaper could rightly take a reporter off news assignments because her outside-of-work activities, including activism on various social causes, could be perceived as biasing the new stories she wrote, thus risking the newspaper's reputation of objectivity (Nelson v. McClatchy Newspapers, Inc. et al. 1997).

Productive Interaction, Not Polarization

Regardless of the media's level of involvement, agreeing on how risks should be portrayed can be challenging. Science and policy experts sometimes view news media coverage of health and environmental risks as oversimplified, inaccurate, and sensationalized. Journalists and reporters, for their part, are occasionally frustrated by technical and policy professionals who appear unhelpful, arrogant, or controlling.

> Working productively with reporters and journalists can lead to a more informed, empowered, solution-oriented public.

Nevertheless, experts who deal with issues involving health and environmental risks cannot afford to ignore media representatives or criticize them from afar. Entire industries have discovered the power of the news media to influence their financial bottom lines. In 2012, Beef Products Inc. sued ABC News for defamation, claiming that inaccurate stories about the finely textured beef called "pink slime" forced the company to close three of its four U.S. plants and lay off more than 650 workers.

On the other hand, some evidence indicates that the more publicized a disaster, the faster donations and rescue help arrives, and the bigger it will be. For example, the Haitian earthquake of 2010 had three times as many stories in print and television news within 10 days of the event than devastating floods the same year in Pakistan, and financial contributions per person for Haiti outpaced those for Pakistan by 10 to 1 (Ferris and Petz 2011).

It is equally true, and this is the position we advocate, that working productively with reporters and journalists can lead to a more informed, empowered, solution-oriented public. A good example of the benefits of this approach is broad public awareness of AIDS and *Escherichia coli* bacteria risks through media coverage.

The first step in working effectively with media representatives is to understand their goals and constraints. Only then can risk communicators apply the guiding principles for care, consensus, or crisis communication. The rest of the chapter deals with news media sources most familiar to the general public: television, newspapers (print or online), and radio. Social media is covered in Chapter 19.

UNDERSTANDING CULTURAL DIFFERENCES

A researcher at a national laboratory was interviewed for the first time by a reporter about a technology destined for eventual use by the public. The researcher, flattered by the reporter's interest and questions, carefully explained the detailed technical workings of his invention and its uses. When asked, he freely discussed some of the technology's potentially controversial characteristics, downplaying the potential for public rejection. When the resulting news article was published, the researcher felt betrayed by its tone, viewing it as a misrepresentation of the technology that emphasized its controversial aspects rather than its benefits. "I thought the reporter was my friend," the researcher lamented.

The problem lay in the fact that the researcher had approached the interview as he would an informal discussion with one of his peers. Lacking an understanding of the reporter's mission and without his own goals for the conversation, the researcher inadvertently contributed to an article that disparaged his own technology.

This incident illustrates some of the differences between the ways subject matter experts and news media representatives traditionally approach risk communication. We call them cultural differences because the two groups have their own, sometimes competing, values, traditions, and practices. Understanding the following differences can help risk communicators more effectively work with reporters and journalists.

The News Media Are Event Focused

Reporters are largely reactive, reporting on the facts surrounding an event or an ongoing risk. Scientific risk may have little to do with environmental coverage presented on the nightly news, for example. It is more often driven by the traditional journalistic news values of timeliness, geographic proximity, prominence, consequence, and human interest, along with the television criterion of visual impact.

News coverage is driven by timeliness, geographic proximity, prominence, consequence, human interest, and visual impact.

Because of limited staff expertise in technical issues and constraints on space and time, the media may give little emphasis to explaining the likelihood of the hazard occurring under various conditions, broader societal or policy issues surrounding the risk, or other contextual information. Technical and policy experts, in contrast, are highly concerned about fostering rational decision making by the public, meaning providing information about immediate and long-term consequences, costs and benefits of a hazard and its alternatives, and the moral and economic issues that are inherent in hazardous processes and events. Thus, risk communicators, especially in dealing with complex decisions, should not rely on the news media alone to fully provide the contextual and background information necessary for well-informed decision making.

Certain Kinds of Risks Get More Coverage

Research has shown that the U.S. news media disproportionately focus on hazards that are catastrophic and violent in nature, new, and associated with the United States (for example, Adams 1986; Combs and Slovic 1979; Singer and Endreny 1993). Drama, symbolism, and identifiable victims, particularly children or celebrities, make risks more memorable. Controversy ensures greater coverage. This is especially true for online news, where journalists are incentivized to write stories that generate more clicks and rank them higher in Google searches.

Risks are not covered in the news media commensurate with their probability of occurrence. For example, airline crashes with fatalities are covered far more extensively than heart disease, though diseases take 16 times as many lives as accidents. The result, adding to the risk communicator's challenge, is that people consistently misjudge the frequency of certain lethal events, according to studies (for example, Combs and Slovic 1979). Thus, those communicating risks in a crisis situation may find it very easy to get media attention, whereas those in care or consensus communication situations may have more difficulty reaching their audiences through media forums.

> Risks are not covered in the news media commensurate with their probability of occurrence.

Journalistic Independence and Deadlines Affect Content

Many technical professionals view the news media as a conduit or pipeline, responsible for transporting technical information to the public (Nelkin 1994). Regarding the media as a technique to further their own goals, they expect to control the flow of information to the public just as they do within their own domains, and feel betrayed when their views are challenged.

In industry, government, and academia, extensive peer review systems ensure that information is approved by the appropriate authorities before release. This process is designed to eliminate technical errors and ensure that all parties have a chance to agree on how the material is presented. In contrast, journalists are charged with being independent watchdogs of society (Society of Professional

Journalists 2014). Allowing a source to review an article, other than verifying complex subject matter, is seen as opening the door to media censorship. Reporters pride themselves in giving their audiences an independent view of a situation, untainted by corporate or academic influence. Credible journalists will consistently and vigorously strive to get the facts right, but they do not appreciate being told how to say something.

Deadlines are another reason for the lack of source review. Reporters may not have time to check back with each source on every story. Sometimes when reporters do take the time, their sources—especially those not familiar with media practices—want to add material, change their quotes, nitpick about wording, argue about the interpretation or theme of the article, and ignore word limitations. Both of these factors—independence and deadlines—mean that the risk communicator often has little control over the published or broadcast story.

The Need for Balance Invites Opposing Views

The American view of fair and impartial reporting is to present divergent points of view on a given issue. Ironically, this attempt at balance sometimes results in an unwitting imbalance—the view of a vocal, self-proclaimed expert or media-savvy special interest group can be made to seem just as valid as that of a peer-reviewed group of scholars or even a worldwide scientific consensus.

Many reporters are reluctant to characterize the nonscientific or special interest view point as such for fear of appearing biased.

Adding to the reporter's challenge is the fact that members of the scientific community sometimes disagree among themselves on the same topic. For example, during the H1N1 outbreak in 2009 in the United States, federal and local entities held competing press conferences that confounded the news media. Such "dueling experts" stories may leave audiences confused and concerned that the risk is unknowable if not even the experts cannot agree on it.

> Many accusations of inaccuracy follow less from actual errors than from efforts to present complex material about risk in a readable and appealing style.
> —Dorothy Nelkin (1994, p. 233)

Information Is Condensed, Simplified, and Personalized

In today's information-glutted world, media stories must grab and keep the audience's attention. Stories for television, radio, web-delivered content, and other news media do not generally lend themselves to long discourses. In addition, many reporters are generalists with little or no background in science and technology.

When describing risks, journalists see their responsibility as informing people of potential dangers and identifying ways people can respond. To do this, they want to give people specific warning signs to alert them to danger and to tell them where to go for help and how to alleviate the risk. Concepts important to technical professionals, such as probabilities, uncertainties, risk ranges, acute versus chronic risks, and risk trade-offs, do not translate well in many news media formats.

> When describing risks, journalists see their responsibility as informing people of potential dangers and identifying ways people can respond.

In one example, a *New York Magazine* cover story, “The Uninhabitable Earth,” David Wallace-Wells describes the planet’s future as a litany of horrors brought on by climate change (Wallace-Wells 2017). It describes a number of extreme climate possibilities, including the idea that some parts of the Earth will experience a combination of heat and humidity so intense that human beings won’t be able to survive outdoors in some regions. The article claims to be “the result of dozens of interviews and exchanges with climatologists and researchers in related fields and reflects hundreds of scientific papers on the subject of climate change.” But when the story came out, climate scientists and science journalists worldwide challenged the dire scenarios. They pointed out that article did not state the likelihood of the worst-case scenario occurring, which is quite low. Neither did the article discuss the range of more likely, and less catastrophic, outcomes.

In a subsequent interview with *Washington Post* reporter Chris Mooney, Wallace-Wells confessed that perhaps the scenario’s likelihood should have been discussed and admitted that he himself feels a warming of 2.5–3 degrees Celsius is most likely by the end of the century, rather than the apocalyptic 6–8 degrees that served as the basis for his story (Mooney 2017). This example shows that reporting that ignores the probability of a risk can come across as deliberately misleading, especially in the scientific community.

To humanize and personalize the risk story, news organizations often use the plight of an individual affected by a hazard, regardless of how representative the person’s situation is. National media coverage of breast cancer from 2003 and 2004, for example, focused on personal narratives of cancer patients rather than data and statistics by a two-to-one margin (Atkin et al. 2008).

Condensing, simplifying, and personalizing information may make information more accessible to the public, but they may result in incomplete and sometimes unbalanced information for making personal risk decisions.

GUIDELINES FOR INTERACTING WITH THE NEWS MEDIA

Understanding the differences between risk experts and media professionals is the first step in effective interaction. We do not mean to suggest that the two groups are mutually exclusive. It is possible to find places where the interests of the two cultures converge, fostering a jointly beneficial working relationship. For successful media interactions, we suggest the following broad guidelines. They apply equally to care, consensus, and crisis communications unless specified.

Develop Relationships with Local and Regional News Media Representatives

Journalists need information and ideas for stories that have importance for the local community. Risk communicators should think of themselves as resources who can make it easier for journalists to do a good job. Lawrence Wallack, professor at the University of California-Berkeley's School of Public Health and Director of the Berkeley Media Studies Group, recommends providing journalists with timely, accurate information; examples of local activities; summaries of key issues; and names of potential sources (Wallack et al. 1993).

> Demonstrating that you want to serve as a source of information, rather than merely satisfying your self-interests, is the best way to build a long-term relationship with reporters.

An ongoing working relationship with media representatives makes it much more likely that you will get a fair hearing when a reporter is doing a story about a particular event.

Demonstrating that you want to serve as a source of information, rather than merely satisfying your self-interest, is the best way to build a long-term relationship. Identify and meet with reporters and editors who cover your organization and exchange contact information. Hold roundtable discussions and briefing sessions to receive feedback from reporters and to share information about your organizations. Invite reporters to participate in emergency preparedness drills and training exercises. Host familiarization tours (called fam tours), usually with expenses paid or split with the news outlet, where journalists are invited to an on-the-record experience such as touring a nuclear power plant to learn about how it operates, while also getting photos and B-roll.

In all of these activities, the goal is to build a reputation as a trustworthy, articulate source on one or more topics, so that you will be sought out in the future. Other goals could be determining which news media to include in your outreach efforts, getting feedback from reporters on working together with them, and improving the accuracy of reporting (Hyer and Covello 2005).

Go beyond individual reporters. You may wish to include other media gatekeepers such as newspaper editors, editorial boards, and television producers who influence what becomes news and how news is reported.

When developing these relationships, keep in mind that journalists are not allowed to accept gifts, and some may even be sensitive to allowing a source or publicist to purchase a meal for them. It's best to ask about the news outlet's policy. At one newspaper, an editor became furious when a national coffee company sent each reporter a pound of coffee beans as part of a product launch.

The editor walked around and removed the package from each reporter's desk and delivered the coffee to the local food bank.

Know When to Approach Media Representatives or When They May Approach You

When there is a potential for immediate public health or environmental risk, it is necessary to contact media representatives without delay so that people can be informed about how to avoid or reduce the risk. We recommend that organizations that may face such crisis communication situations preestablish media protocols, including the use of trained spokespeople. The organization's top leaders, including presidents, operations managers, and agency heads, should be ready to speak clearly and candidly to the public through news media outlets.

The intent of such preparations is not to downplay the risk situation or deflect blame but to respond as quickly and effectively as possible to alert people to danger. (See Chapter 2 for more information about crisis communications and Chapter 15 for more information on choosing and coaching a spokesperson. See Chapter 22 for advice on working with the news media in emergency situations.)

> The intent of establishing media protocols for potential crises is not to downplay the risk situation or deflect blame but to respond as quickly as effectively as possible to alert people to danger.

Be aware of work you are involved with that may prompt media attention. This work may be a topic that has been featured recently in the media (such as the dangers of front-seat airbags for small passengers), has local applicability (a study about drinking water contamination from flooding would get more coverage in communities' subject to overflowing rivers), or is of broad public interest (anything that could raise or lower cancer risks, for example). Inventors at one company developed an airport scanner that detects concealed plastic or metal weapons on passengers. Whenever there is a publicized airline incident thought to involve weapons, the inventors prepare themselves for a flurry of media inquiries regarding airport security technologies.

Timing and accuracy are important in releasing information to the public through the media. Make sure that the information you are releasing is mature enough to be credible and defensible. One scientist independently released his findings about potential electromagnetic hazards of cell phones right before the Christmas season. The research had not been reviewed by others, and it was presented without explanation of its preliminary nature. The resulting media coverage prompted enough controversy that his company faced potential lawsuits from cell phone manufacturers angry about losing business.

Prepare Messages and Materials Carefully

Planning is critical for successful media interaction. When preparing to talk with a reporter, understand what might be asked and consider in advance how to respond. Table 16.1 gives examples of questions to help you prepare interview responses.

For an interview, have two or three short, crucial messages that you want to leave with the audience. According to Rene Henry, who led communications for the mid-Atlantic States region of the U.S. Environmental Protection Agency, sound bites broadcast from interviews average 7.2 seconds; quotes from print materials average 1–2 seconds (Henry 2000). In developing these messages, consider what the audience most needs to know, most wants to know, and is most concerned about. (See Chapter 9 for more details on message development.) Find ways to "bridge" the conversation to these points even if you are not asked questions that directly reflect them. This way, you not only answer the reporter's questions but also focus on the most critical information. Hyer and Covello (2005) offer more than 30 bridging statements that may be useful when speaking.

Take advantage of advice and training provided by public affairs specialists in your organization or through consultants. Many organizations use professional trainers with news media backgrounds when a finding of high public interest is about to be released. These trainers put technical and managerial staff who will be

Table 16.1. Questions to Ask Before an Interview

Background questions	What is the reporter's name, organization, and phone number? What stories has the reporter previously covered? Who generally reads, sees, and/or hears the publication or program?
Logistics questions	Where and when will the story appear? What is the deadline for the story? Where will the interview take place? How long will the interview take? How long will the story be? Does the reporter verify the accuracy of specific quotes attributed to the person being interviewed?
Topical questions	What is the story's theme? What topics does the reporter want to cover in the interview? What types of questions will be asked? Has the reporter done any background research? Does the reporter want to receive background material before the interview? Who else has been interviewed? What did they say? Who else will be interviewed?

Adapted from work by Vince Covello (for example, CDC et al. 2003).

spokespersons through extensive rehearsals, giving them realistic practice in explaining the significance of findings and in responding to challenging questions. For more information on selecting an appropriate spokesperson for various situations, see “Choose the Appropriate Spokesperson” in Chapter 15.

Offer to provide photos or video footage appropriate to the medium. Remember that for television, pictures, rather than words, usually determine what the audience remembers.

> [Scientists who go into a media interview unprepared] will be required to present the equivalent of a one-draft dictated statement without preparation or notes to an audience of a few thousand to several million people, most of whom know nearly nothing about the topic. In view of the task, the arrogance of some scientists seems inappropriate; terror would be more justified.
> —Robert McCall (1988, p. 87)

Know Where to Draw the Line

Reporters often will ask questions outside the scope of your expertise. When you are asked a question for which you do not know the answer, it is perfectly acceptable to say, “I don’t know,” or give the reporter another source who will know the answer. Avoid speculating about a hypothetical situation. Avoid guessing, especially in matters that involve quantities. For example, when asked how many people in your community may be affected by a certain risk, one response is to give a range based on various conditions.

Be aware of the limits of your position in representing your organization on a particular issue. One technical expert declined to be interviewed on radio with the head of a nationally known civil liberties organization. The reporter was asking them to discuss public acceptance aspects of a new technology that the expert was developing. Sensing a potentially contentious debate that held little value for his project, the technical expert declined that particular format. “I’m an engineer, not a constitutional lawyer,” he explained to the reporter. He did, however, agree to do other, selected media interviews that focused on the need for the technology and its applications.

When being interviewed, do not feel obligated to answer every question. Never say anything you do not want to see in the paper or on the air. There is no such thing as “off the record,” despite what we see in the movies. Do not say “no comment,” especially in a crisis communication situation; many audiences will interpret that as an assumption of guilt on the part of the organization.

> When being interviewed, do not feel obligated to answer every question.

Examples of better responses are as follows:

- I don’t know, but we’re working to learn the answer.
- I’ll have an update at [a specific time] or [when we learn X].

- I wasn't involved in that aspect, but I can tell you about . . . .
- This isn't about blame, it's about saving lives [property, the environment]. Here's what we're doing . . . .

Put Your Message in Terms That the Reporter's Audience Can Understand

When providing printed or visual information to media representatives, or when being interviewed, remember that you are not speaking to your peers but to a general audience. Many of them know far less than you do about the risk in question. Guide journalists in interpreting the results of studies. Replace all technical jargon with terms and concepts to which the public can relate. It may be helpful to pretend that you are talking with your neighbors or to a relative who does not know what you do.

People need a "yardstick" to evaluate a new or unfamiliar risk. For example, in reported studies of electromagnetic fields, exposures often are compared with levels received from home appliances. (But be cautious about comparisons. See "Principles for Comparing Risks" in Chapter 6.) And get to the point: What is the bottom-line message about the risk that people should know? Audiences typically want to know two things: How does this affect me and my family, and what can I do about it?

Audiences typically want to know two things: How does this affect me and my family, and what can I do about it?

Prepare digital press kits or background information for media representatives. Reporters may use the information as reference material to help them put the story in context or as self-education about technical details.

Your online information could include, for example, high-quality video and photos, fact sheets, a question-and-answer list, a press release, and a point of contact. The information should use nontechnical, straightforward language; the closer the language to what the reporter will write or produce, the better. Busy reporters will often ignore background information that is crammed with technical journal articles, official reports, or promotional materials that have been doctored with the organization's "spin."

Put the Risk in Perspective

In providing printed, visual, or oral information, tell how new findings build on or contradict previous studies. This kind of "big picture" approach helps audiences evaluate the risk. A way to help audiences evaluate the magnitude of the risk is to differentiate between relative and actual risk. Cristine Russell, Special Health Correspondent to the Washington Post, uses the following example: A finding that a drug poses nine times greater risk of cancer (its relative risk) is misleading without explaining that the cancer has an *actual risk* of one in a million of occurring in the first place (Russell 1993).

Similarly, Russell encourages communicators to distinguish between individual and societal risk. Is the risk a public health problem, or is it significant only for a localized or specialized population with certain characteristics?

To make its risk coverage even more useful, the British media conglomerate BBC News developed the following reporting guidelines for its journalists (Harrabin et al., 2003). Risk communicators may find them helpful in preparing messages:

- What exactly is the risk? How big is it? Whom does it affect?
- How has the risk been measured? How big is the sample?
- Who funded the research? How reputable is the source?
- If you are reporting a relative risk, have you made clear what the baseline risk is? (For example, a 100% increase in the problem that affects one person in 2000 will still only affect one in 1000.)
- Have you asked how safe is this rather than is this safe?
- If a scientist or a victim is taking a view that runs against majority scientific opinion, is that clear in the report and in the casting of the discussion and subsequent questions?
- Have you told the audience how to find more information?
- Can you find a comparison to make the risk easier to understand?
- Have you given the audience information to put the risk in context? (For example, women who stop taking the pill during a pill scare face worse risks from either abortion or childbirth.)
- Is the scale of reporting in proportion to the extent of the risk? Will our reporting increase or decrease risks in society?
- Can we use a story about a specific risk as a springboard to discuss other related risks (for example, train safety versus road safety)?

Recommend that the reporter interview other people who see the risk from a different angle: those who cause, manage, benefit from, study, or prevent it. Including such a variety of people is especially useful in a press conference. This holistic approach gives audiences a clearer picture of the risk by illuminating more dimensions and points of view.

Respect the Reporter's Deadlines

Don't let yourself be caught off guard by a reporter. Find out the reporter's deadline, then tell him or her that you need a few minutes to collect your thoughts and check some facts, and get the phone number. Use that time to alert whomever needs to be informed in your organization, and develop and practice your talking points.

Return calls as soon as possible. Provide additional information, video clips, photos, and reviews of materials when you say you will. You may only get one chance to provide information. If you do not respond on time, the story will appear or air without your input.

Maintain Ethical Standards of Disclosure

When talking with media representatives, disclose any proprietary interest or other potential conflict of interest. This applies especially to scientific findings or risk-reduction technologies with direct personal benefit to you or your organization. The Jacobs Institute of Women's Health describes the increasing use of self-serving information releases that actually are advertising, such as highlighting premenstrual syndrome and menopause programs, two examples that have been used to generate revenue for health institutions (Lebow and Arkin 1993).

An example of ethical disclosure is identifying a research sponsor that could be seen as biasing the results, such as studies on lung cancer sponsored by the tobacco industry. If you fail to disclose an aspect of the work that is later shown as covertly benefiting you, your organization, or your sponsor, you and your work risk losing credibility with both the news media and the public.

Take Action When Inaccurate or Misleading Material Is Published or Aired

Reporters almost never ask a source to review a story before it is aired or published, though you can encourage reporters to fact-check a story with you before it runs. You do have the right to ask the reporter what the gist of the story will be. You can also ask to have your quotes read back to you during an interview.

You should alert reporters about factually inaccurate, incomplete, or misleading reporting after it has appeared, especially when it's online. Even small mistakes (misspelled names, key details like ages or dollar amounts) can be problematic if not corrected in the online version of the story. The online version can be corrected relatively easily and that ensures the error is not repeated when the story is used for reference in the future.

> Avoid complaining about the journalists' writing style, omission of superfluous details, or elements that do not change the main message of the story.

Use this option judiciously. Avoid complaining about the journalist's writing style, omission of superfluous details, or elements that do not change the main message of the story. Keep your end goal in mind: to get a more correct story next time, not to badger the reporter for an apology.

Most journalists appreciate being alerted to inaccuracies; they want to be viewed as credible. However, do not expect an automatic correction. Policies on printing or airing corrections or apologies depend on the news outlet and the severity of the mistake.

Note that if you are being interviewed by a reporter on a controversial topic to ensure that you are quoted correctly, you can't record the interview without telling the reporter. State laws differ, but best practice is to tell the reporter that you want to record the interview for mutual protection, then repeat that "on tape" so the permission is part of the recording.

Evaluate News Media Coverage

Regardless of how you engage with the news media, if you are including media coverage as part of your risk communication efforts, be sure to evaluate its usefulness:

- Reach of the news coverage, based on the circulation and viewership of the primary media outlets, or by hiring a news tracking service such as Meltwater
- Extent to which the information was accurate, edited appropriately, and conveyed your messages without distortion
- Information conveyed by partners reinforced the same messages

Many commercial organizations offer news clipping and analytics services for traditional and social media.

For health care journalism, the watchdog organization HealthNewsReview.org evaluates stories in major news outlets based on how they answer the following questions:

- What's the total cost?
- How often do benefits occur?
- How often do harms occur?
- How strong is the evidence?
- Is this condition exaggerated?
- Are there alternative options?
- Is this really a new approach?
- Is it available to me?
- Who's promoting this?
- Do they have a conflict of interest?

HealthNewsReview found, for example, that valid scientific studies that showed no association between midlife physical activity and long-term cognitive decline were covered much less frequently than studies showing that exercise can ward off dementia. The author argued that this may also reflect some degree of journalistic bias against covering negative studies that are deemed less clickable (Lomangino 2017).

Use media evaluation to modify your communication strategy while it is in process, or for future efforts. For example, you may realize that you need to focus media and partner interactions more closely on key messages. You may ask your spokespersons to address new misperceptions or gaps that cropped up in initial media coverage. If you see that the news media have touched on a new "slant" to the story that you had not anticipated, you may wish to capitalize on that by reaching out to additional types of media such as trade publications or social media outlets that specialize in that topic.

Of course, the best outcome is to what extent the media coverage helped achieve your goals in care, consensus, or crisis communication. This is often difficult to tease out because people get information from multiple sources, and it's challenging to tie attitudes and behavior changes to particular information sources. Nevertheless, depending on your risk communication goals and resources, you may want to ask members of your target audiences or stakeholder groups how they learned about the risk, and include the news media among the choices.

Other information on evaluation can be found in Chapter 10. Specific guidelines on evaluation of social media are covered in Chapter 19. Evaluation of public health campaigns is described in Chapter 24.

GETTING THE WORD OUT

Part of interacting with media representatives is making them aware of your news, as described in this section. You may also consider public service announcements and telebriefings as risk communication distribution tools.

Distribution Services

Many organizations distribute their news releases using subscription-based web services that make news available to journalists. For risk-related news, many of these services are in the science and technology realms. One such service is EurekAlert!, operated by the American Association for the Advancement of Science. EurekAlert! is an online press service with which journals, research institutions, universities, government agencies, corporations, and others can distribute science-related news to reporters and news media.

EurekAlert! also archives its press releases for the public. As with many online press services, you must register on the site as a public information officer to submit a news release. Only those who have registered as a reporter or freelancer can access embargoed news for use in a news story.

Other subscription-based distribution services at the time of this writing, such as Cision and PR Newswire, enable your organization to target specific topics, journalists in specific geographic areas, outlets including websites and blogs, and other attributes. Some organizations have agreements with services such as PR Newswire to autopublish news on certain topics on their websites

Many organizations use e-mail lists to distribute their news releases on a regular basis. Make sure that each release contains an e-mail link to a contact person and the organization's website address.

You can also use services that match reporters and sources. With the subscription service Profnet, part of PR Newswire, a reporter sends a topical query to the service at no charge, and Profnet compiles the queries and dispatches them to institutional subscribers ("experts"), who then contact the reporter directly with their information that fits the query.

Many organizations use customized e-mail lists to distribute their news releases. These are often based on relationships built with reporters over time and include the outlets most likely to be interested in the news topic. Make sure that each release contains an e-mail link to a contact person and the organization's website address. To capture the attention of busy reporters, use a descriptive subject line in the e-mail (not "Press Release from ABC Company" but "New Discovery Reduces Health Risk from Asbestos"). Link to online background information, photos, video, and other media when available. Include an "unsubscribe" option.

Images, Video, and Audio

When you are pitching a news story, include links to high-quality images with captions and video and audio if available. A video, for example, could show a new sensor technology that makes it easier for first responders to do their jobs. An audio clip could be a few-second interview by someone using the technology during an emergency exercise. Provide links to these multimedia pieces for reporters to access from your website, your YouTube channel, and so on. A reporter may ask for the raw video, B-roll, or audio to edit for a story; know your policy in advance for providing raw files.

Live-streamed video such as Facebook Live can be a powerful source of news, especially during a crisis or emergency. More people will come to your Facebook page and other social media during an emergency than will come to your website—though you can refer them to your website for more in-depth information. Make sure your spokespeople have rehearsed being on camera, especially for an emergency. In May 2017, when an old nuclear site tunnel containing radioactive waste collapsed in Washington State, a spokesperson giving a live-streamed public briefing initially took some heat on social media for looking panicked and stumbling over his words. He was more relaxed in subsequent briefings, projecting a more assured manner.

Connecting with Reporters on Social Media

The rise of social media is influencing how journalists report risk and other topics in two important ways. First, journalists are delivering their news via more social media platforms, thus targeting more niche audiences. Second, journalists are using social media channels to find and develop story ideas. They use social media to research individuals or organizations, participate in conversations, monitor sentiment or discussion, keep up on issues or topics of interest, and find sources.

In a survey of 30 international journalists, 75% said they viewed social media as either essential or important in bringing potential stories to their attention earlier and getting news out more quickly (Insignia Communications 2014). Half said they use social media as a critical information source to obtain eyewitness accounts, unofficial information, potential interviewees, video footage, and images. Many have work-related Twitter accounts, professional Facebook pages, and their own blogs or podcasts.

How can your organization take advantage of this phenomenon to communicate about risks in the news media? Engage in the journalists' own social media channels to get a feel for what they cover and are interested in. This can also help you direct your story ideas to the most appropriate journalists. Use your own blog or other social media channels to get journalists' attention. Post comments on relevant content to establish yourself as an expert.

Create profiles on social networking sites and use relevant tags, or key words, so that journalists can find you easily when searching these sites. Take care, however, when pitching story ideas to media bloggers. Understandably, online journalists get annoyed when they receive pitches that do not relate to their blog topics. Choose blogs carefully and create customized pitches for each. Chapter 19 includes more information on reaching out to social media "influencers."

Remember that the personal touch is still important. Journalists still value traditional communications and relationship building when researching stories.

For more on how organizations can use social media to communicate about risks, see Chapter 19. For using social media in emergencies, see Chapter 22.

Public Service Announcements

Public service announcements (PSAs) are advertisements that serve the public interest. PSAs educate and raise awareness about significant social issues in a way that will change attitudes and behaviors and create positive social change. PSAs are not intended to promote a commercial product, brand, or service, and are usually put out by government and nonprofit organizations. PSAs are common in care communication, such as anti-obesity campaigns, and crisis communication, such as the Federal Emergency Management Agency telling people how to get help after a flood. TV and radio are the most common media outlets, but newspapers, magazines, and websites may also accept PSAs.

Most PSAs run as a community service at no charge by the media, but some run in purchased time and space. Some nonprofit organizations and government agencies, such as the Centers for Disease Control and Prevention, purchase media time and space for some of their PSAs. This gives them more control over placement and scheduling.

Most PSAs run as a community service at no charge by the media, but some run in purchased time and space.

PSAs were more common in the past, when the Federal Communication Commission imposed stricter requirements for broadcasters to demonstrate that they were operating in the public interest. Today, with deregulation, most stations are setting their own standards on what constitutes fulfillment of their public service programming responsibilities to their local communities. Some stations run their own community-affairs programming instead of PSAs. Others air public-service-type messages from paying advertisers and use on-air promotions featuring their own network TV stars. Stations may run PSAs in the early morning hours when audiences are almost nonexistent, thus meeting the letter of the law but not the spirit. To counter this trend of diminishing PSAs, some organizations are delivering more content through video and B-roll to the same markets that used to run PSAs.

Print publications also run PSAs to match unsold ad space. The choice to publish PSAs usually is decided by the publisher's office and handled through the advertising or marketing departments.

Nevertheless, PSAs may be one strategy in an overall risk communication program. Sometimes, a local ad agency may develop a PSA for your organization at no charge; local media may also lend their development support. The Ad Council supplies dozens of free, high-quality PSAs (including products for digital media); risk-related topics range from emergency preparedness to autism awareness. The Centers for Disease Control publishes a wide variety of health-related, culturally relevant PSAs and podcasts on its website. In creating PSAs, it is important to tailor the message to audiences you are trying to reach and restrict the content to one takeaway message.

Understand the various media's policies, lead times, and required formats. If the PSA relates to a specific event, make sure that it gets to the stations at least 2 weeks in advance, to allow them time to schedule it.

You can evaluate PSA campaigns through media exposure, audience response, website analytics, and pre- and post-tracking surveys that measure awareness and attitudinal and behavioral shifts among the target audience.

Telebriefings

Telebriefings use a conference call format that replaces or augments the traditional press conference. Similar to a conference call, they can be conducted anywhere and do not require participants to travel to a news conference location.

Sometimes the telebriefing is broadcast via streaming audio on the Internet. The Centers for Disease Control and Prevention (CDC) conducts frequent telebriefings on public health topics including opioid addiction, diabetes-related kidney failure, and many others. The CDC sends an e-mail message to its listserv of media and provides a listen-only line to public health and Congressional contacts, giving them a toll-free number to call and a time for the briefing. CDC Media Relations hosts the briefing with a group of experts, and reporters ask questions following a brief opening statement. CDC posts transcripts and audio recordings of its telebriefings on its website.

When considering a telebriefing, plan accordingly for capacity. The CDC, for example, pays for 100 phone lines to handle the deluge of callers during and after each telebriefing.

DEALING WITH FAKE NEWS

> "A lie travels round the world, while Truth is putting on her boots."
> —Charles Haddon Spurgeon

Fake news, sometimes called false news, is deliberate misinformation or hoaxes spread via traditional media, social media, or fake news websites. Fake news is published with the intent to mislead for financial or political gain, often with sensationalist, exaggerated, or deliberately false headlines and content that grab attention and increase readership. The phenomenon goes beyond false stories, quotes, and doctored photos. Video and audio manipulation tools can create video where public figures are shown "speaking" about things they never discussed. Fake news can spread rapidly and powerfully, changing public perceptions while sowing mistrust.

Fake news undermines serious media coverage and makes it more difficult for legitimate journalists to cover significant news stories. A 2016 Pew Research poll found that 88% of U.S. adults believed completely made-up news had caused "a great deal" or "some" confusion about the basic facts of current events (Barthel et al., 2016). Additionally, 23% of those polled admitted they had personally shared fake news, whether knowingly or not.

In risk communication, fake news, whether delivered inadvertently or intended maliciously, is dangerous because it can confuse people about the nature of a risk and how to respond to it.

The fact-checking site Snopes.com, for example, called out a 2017 conspiracy-peddling website, Your News Wire, when it published a story— devoid of any citations or named sources—with the headline "Fukushima Officials: Humans Should Never Eat Fish Again." The site claimed that Fukushima scientists concluded that "the days of eating fish from the Pacific Ocean are well and truly over" because of widespread contamination from the 2011 tsunami and resulting nuclear disaster. Snopes rated this claim as false because it misrepresented a questionable blog post as a scientific investigation and drew from no-longer-accurate blog posts from 4 years before. Nevertheless, the story had already caused substantial concern after being repeated on dozens of websites and social media channels.

Risk communicators need to be aware of and respond to fake news, whether they are scanning the news landscape to understand how certain risks are portrayed, answering questions from media about risk news that has appeared online, or correcting inaccuracies by untrustworthy news sources. Organizations should be prepared to respond to and minimize the risk and damage of fake news. Make sure key individuals are prepared to speak to legitimate media and are communicating a consistent message. Avoid repeating or acknowledging the fake news content.

Risk communicators also need to avoid perpetuating fake news. How do you spot and avoid fake news about the risk of concern? Consider these tips from Snopes, Storyful, and other organizations that fight fake news, drawing from Quartz Media (Rodriguez 2017) and others:

- **Use fact checkers.** Sites such as Snopes.com, FactCheck.org, and Factcheck EU evaluate the accuracy of news claims. As of 2017, there were dozens of fact-checking websites worldwide, using more than 100 dedicated fact-checking teams in 47 countries. A good fact-checking service explains its verification process. In 2017, the newspaper *Le Monde* launched a new search engine tool, Decodex, which identifies the reliability of hundreds of websites. When you come to a fake news site, you get a pop-up warning. You can click to see why the fact-checking journalists think it's not trustworthy. The extension is linked to a database that ranks sites as "fake," "real," or "satire."
- **Vet the URLs.** Many fake-news sites resemble real outlets or local news. Look closely at the URL, and be wary of odd domain names or additional domains after the ".com" (e.g., NBC.com.co).
- **Follow the links.** If the news is aggregated from other outlets, follow the links in the story back to the original reporting source and see what else they've published. If it is mostly fringe opinion pieces, there may be an obvious slant in the coverage. If you can't find the original reporting source at all, that should be a red flag.
- **Search key phrases in the story**. Information that sounds too outrageous probably isn't true, or should be treated with suspicion. Plug a few key phrases from the story into Google or another search engine to see if the news was reported by any other credible sources.
- **Check the dateline and timestamps**. Does the timeline match up? Does it connect to the story? The information could be true, but based on an old news story that's taken out of context.
- **Look for visual cues.** Checking the timestamp gets tricky with photos and videos, because anyone can take an image at one place and time and upload

it at another. However, you can drag and drop the photo into Google images or services such as TinEye to see if it has circulated before, and especially if it has been manipulated. As of 2017, using the Chrome browser, you can right-click on a photo and choose "Search Google for image."

See Chapter 19 for more information on fake news in social media.

CHECKLIST FOR NEWS MEDIA

When planning to work with media representatives, assure that:

☐ The role and mission of news media are understood and have been factored into risk communication goals as appropriate.
☐ Productive relationships have been developed with key members of the media who are most likely to cover specific risk issues.
☐ A plan has been prepared for when to approach the media and/or what to do if events prompt them to approach you.
☐ Appropriate social media channels are used to engage journalists.

When working with media representatives, assure that:

☐ Risk messages and materials have been carefully prepared and tailored for specific media.
☐ Reporters are given the information they need and you want to convey, in language aimed at your target audiences.
☐ Questions outside the scope of your expertise or role in the organization are referred to others.
☐ Reporters' deadlines are known and respected.
☐ Ethical standards of disclosure are understood and maintained.
☐ Appropriate action is taken when inaccurate or misleading material is printed or aired.

REFERENCES

Adams, W. C. 1986. "Whose Lives Count?: TV Coverage of Natural Disasters." *Journal of Communication*, 36: 113–122.

Atkin, C. K., S. W. Smith, C. McFeters, and V. Ferguson. 2008. "A Comprehensive Analysis of Breast Cancer News Coverage in Leading Media Outlets Focusing on Environmental Risks and Prevention." *Journal of Health Communication*, 13 (1): 3–19.

Barthel, M., A. Mitchell, and J. Holcomb. 2016. "Many Americans Believe Fake News Is Sowing Confusion." Pew Research Center, December 15. http://www.journalism.org/

2016/12/15/many-americans-believe-fake-news-is-sowing-confusion/ (accessed August 12, 2017).

CDC (Centers for Disease Control and Prevention), Agency for Toxic Substances and Disease Registry, Oak Ridge Institute for Science and Education, and The Prospect Center of the American Institutes of Research. 2003. Emergency Risk Communication CDCynergy, and subsequent iterations. See, for example, https://emergency.cdc.gov/cerc/index.asp (accessed October 15, 2017).

Combs, B. C. and P. Slovic. 1979. "Newspaper Coverage of Causes of Death." *Journalism Quarterly*, 56: 837–849.

Ferris, E. and D. Petz 2011. *A Year of Living Dangerously: A Review of National Disasters in 2010*. The Brookings Institute and the London School of Economics Project on International Displacement, Washington, DC.

Harrabin, R., A. Coote, and J. Allen. 2003. *Health in the News: Risk, Reporting and Media Influence*. King's Fund, London.

Henry, R. A. 2000. *You'd Better Have a Hose If You Want to Put Out the Fire: The Complete Guide to Crisis and Risk Communications*. Gollywobbler Productions, Windsor, California.

Hyer, R. N. and V. T. Covello. 2005. *Effective Media Communication during Public Health Emergencies: A WHO Handbook*. World Health Organization, Geneva, Switzerland. WHO/DCS/2005.31. http://www.who.int/csr/resources/publications/WHO%20MEDIA%20HANDBOOK.pdf (accessed October 16, 2017)

Insignia Communications. 2014. "Company Reputations at Risk as Social Media Revolutionises Breaking News." Thomson Reuters' Zawya. October 15. https://www.zawya.com/story/Company_reputations_at_risk_as_social_media_revolutionises_breaking_news-ZAWYA20141015085127/ (accessed August 13, 2017).

Lebow, . M. and Arkin, E. B. 1993. "Women's Health and the Mass Media: The Reporting of Risk." *Women's Health Issues*, 3 (4): 181–190.

Lomangino, K. 2017. "Physical Activity and Dementia: Another Negative Study, Another Void in News Coverage." *HealthNewsReview*, August 25.

McCall, R. B. 1988. "Science and the Press: Like Oil and Water?" *American Psychologist*, 43 (2): 87–94.

Mooney, C. 2017. "Scientists Challenge Magazine Story About 'Uninhabitable Earth.'" *The Washington Post*, July 12. https://www.washingtonpost.com/news/energy-environment/wp/2017/07/12/scientists-challenge-magazine-story-about-uninhabitable-earth/?tid=a_inl&utm_term=.f1cca5eaa67e (accessed August 13, 2017).

Nelkin, D. 1994. "Reporting Risk: The Case of Silicone Breast Implants." *Risk: Health, Safety and the Environment (1990–2002): Symposium on Technical Risk in the Mass Media*, 5 3: Article 8. http://scholars.unh.edu/cgi/viewcontent.cgi?article=1196&context=risk (accessed October 16, 2017).

Nelson v. McClatchy Newspapers, Inc., et al. 1997. No. 97-187-CSX, U.S. Supreme Court

Rodriguez, A. 2017. "Tips on Fighting Fake News from the People Who Debunk It for a Living." Quartz Media, LLC. https://qz.com/937056/tips-on-fighting-fake-news-from-the-people-who-debunk-it-for-a-living/ (accessed August 12, 2017).

Russell, C. 1993. "Hype, Hysteria, and Women's Health Risks: The Role of the Media." *Women's Health Issues*, 3 (4): 191–197.

Singer, E. and P. M. Endreny. 1993. *Reporting on Risk: How the Mass Media Portray Accidents, Diseases, Disasters, and Other Hazards*. Russell Sage Foundation, New York.

Society of Professional Journalists. 2014. "Code of Ethics." http://www.spj.org/ethicscode.asp (accessed September 12, 2017).

Wallace-Wells, D. 2017. "The Uninhabitable Earth." *New York Magazine*, July 9. http://nymag.com/daily/intelligencer/2017/07/climate-change-earth-too-hot-for-humans.html?utm_source=nym_press (accessed August 13, 2017).

Wallack, L.M., L. Dorfman, D. Jernigan, and M. Themba. 1993. *Media Advocacy and Public Health: Power for Prevention*. Sage Publications, Newbury Park, California.

Young, M. E., G. R. Norman, and K. R. Humphreys. 2008. "Medicine in the Popular Press: The Influence of Media on Perceptions of Disease." *PLoS One*, 3 (10): e3552.

ADDITIONAL RESOURCES

Advertising Council. http://www.adcouncil.org/psa (accessed January 23, 2013).

Bertrand, J. T. and R. Anhang. 2006. "The Effectiveness of Mass Media in Changing HIV/AIDS Related Behaviour Among Young People in Developing Countries." *World Health Organization Technical Report, Series*, 938, 205–241.

EurekAlert! http://www.eurekalert.org (accessed January 23, 2013).

Flynn, J., P. Slovic, and H. Kunreuther, (eds). 2001. *Risk, Media, and Stigma: Understanding Public Challenges to Modern Science and Technology*. Earthscan Publications, London.

PR Newswire. http://www.prnewswire.com (accessed October 16, 2017). Profnet. https://www.prnewswire.com/profnet/ (accessed October 16, 2017).

Sandman, P. M., D. B. Sachsman, and M. L. Greenberg. 1988. *The Environmental News Source: Providing Environmental Risk Information to the Media*. Risk Communication Project, Hazardous Substance Management Research Center, New Jersey Institute of Technology, Newark, New Jersey.

West, B., P. M. Sandman, and M. R. Greenberg. 1995. *The Reporter's Environmental Handbook*. Rutgers University Press, Piscataway, New Jersey.

Windsor, R., N. Clark, N. R. Boyd, and R. M. Goodman. 2004. *Evaluation of Health Promotion, Health Education, and Disease Prevention Programs*, 3rd ed. McGraw-Hill, New York.

17

STAKEHOLDER PARTICIPATION

Having the audience or stakeholders interact directly with those who are communicating, assessing, and/or managing the risk can be an extremely effective way to communicate risk. For example, in 1993, when an abandoned World War I chemical warfare research facility was discovered under an upscale residential community in northwest Washington, DC, the U.S. Army Corps of Engineers took command of the situation and held nightly interactions with the community. Their community involvement is credited for preventing panic, protest, and litigation (Henry 2000).

Stakeholder participation can take many forms, such as self-help groups, focus groups, and advisory committees. Stakeholders can be involved in working through a particular risk issue, such as in a workshop. Stakeholders can also participate in how the risk is assessed or managed, for example, members of the public taking surveys or operating monitoring stations. The least effective but most often used form of stakeholder participation is the formal hearing or public meeting, for which the organization sets a time and place for the audience to present formal testimony, which is transcribed and used later in the risk management process.

Risk Communication: A Handbook for Communicating Environmental, Safety, and Health Risks, Sixth Edition. Regina E. Lundgren and Andrea H. McMakin.

© 2018 The Institute of Electrical and Electronics Engineers, Inc., and Regina E. Lundgren and Andrea H. McMakin. Published 2018 by John Wiley & Sons, Inc.

Stakeholder participation is most effective when key choices concerning the risk have yet to be made. Once an organization is locked on a course of action, participation opportunities dwindle to those that will educate the audience.

Some stakeholder participation programs fail because of a lack of early and continuing involvement (Kasperson 1986). Stakeholder participation is most effective when key choices concerning the risk have yet to be made. Once an organization is locked on a course of action, participation opportunities dwindle to those that will educate the audience. Using stakeholder participation solely to educate is more costly and time-consuming than other forms of risk communication that can be used to educate. Furthermore, many stakeholders willing to participate expect a more substantial involvement and will become hostile when they realize that their activities are limited, further constraining the risk communication effort.

Stakeholder participation is an important way to communicate risks in consensus communication and planning for crises. Two blue-ribbon panels (the Presidential/Congressional Commission on Risk Assessment and Risk Management and the National Research Council's Committee on Risk Characterization) advocated stakeholder participation throughout the risk assessment, risk management, and risk communication processes (Commission 1997; NRC 1996). Some research indicates that the public may be more supportive of decisions that were reached through a stakeholder participation process, even if they were not personally part of that process (Arvai 2003).

In this book, we make the distinction between stakeholder involvement—engaging those at risk in the risk assessment, risk management, and risk communication process—and partnerships (engaging other agencies or organizations to contribute to the risk assessment, risk management, and risk communication process). Advantages and disadvantages of stakeholder participation and partnerships are discussed in Chapter 10. Partnerships are discussed in Chapter 20. This chapter discusses requirements for successful stakeholder participation, provides guidelines for specific types of stakeholder participation activities, and gives advice on how to choose a form of stakeholder participation.

REQUIREMENTS FOR STAKEHOLDER PARTICIPATION

To choose a form of stakeholder participation, you need to consider both organizational and stakeholder needs. Your organization must be comfortable with the way it interacts with stakeholders and vice versa. You can then evaluate the various forms of stakeholder participation for application to your situation.

Organizational Requirements for Successful Stakeholder Participation

For any form of stakeholder participation to succeed, your organization must be fully committed to it. Everyone involved with the risk assessment and risk management process—the scientists and engineers, the public health professionals, the technicians, the communicators, the public affairs specialists, the risk managers, and the organization's line managers—must believe that stakeholders have a right to be and can be involved. If anyone has reservations, those reservations will be apparent to the stakeholders and spoil any chance for meaningful interaction. Because many organizations are less than committed to stakeholder participation, effective participation in risk communication has been limited. However, in those cases in which participation has been successful, both the stakeholders and the organization have deemed the participation well worth the effort (see, for example, Aleknavage and Lyon 1997; Beierle 2002).

> For any form of stakeholder participation to succeed, your organization must be fully committed to it.

To make the effort acceptable to all involved in the risk assessment and management process, you need a clear plan. You need to know your purpose and objectives, your audience (stakeholders), your schedule, and the resources at your disposal. If these factors show that stakeholder participation would be an effective way to communicate risk, you then need a compelling reason that will convince the organization. Perhaps stakeholders have perspectives that would be particularly valuable to the risk assessment or management process. Perhaps no other method will bring about the desired results. Perhaps a regulation or policy mandates stakeholder participation. Presenting your plan and this compelling reason to the others involved with communicating, assessing, and managing the risk, and having a list of cases in which effective stakeholder participation made for a more effective risk management decision, can help convince management of the need to involve stakeholders in a meaningful way. (See Aleknavage and Lyon 1997; Arvai 2003; Beierle 2002; Imholz et al. 1990 in this chapter's reference list; and additional examples of case studies in Resources at the back of this book.)

What most organizations fear about stakeholder participation is that the organization might lose control over the risk decision. However, stakeholder participation can strengthen that decision by:

- Identifying stakeholder perceptions early in the process so that the organization does not find out after the decision is made that stakeholders are unwilling or unable to support or implement it
- Developing a consensus among all parties affected by the risk, giving the decision a weight it can achieve in no other way
- Helping to prevent conflicts such as lawsuits that can delay making or implementing the decision

In addition, inviting stakeholders to participate in the communication, assessment, or management of the risk can raise their awareness, inform them, and motivate them to action more strongly than any other form of risk communication.

Case Study: Chinese Citizens Thwart a Planned Nuclear Facility

Despite its restrictive political system, China has seen frequent antinuclear protests since Japan's 2011 Fukushima disaster. Little experience dealing with the outside world has also left the Chinese nuclear sector without the tools to persuade the public that its power stations are safe.

In 2013, thousands of residents took to the streets in Jiangmen, south China, to protest a planned uranium processing plant that would supply nuclear fuel. Critics said they were most bothered by the lack of transparency and their inability to play any role in determining where the plant would be located. The authorities apparently worked hard to head off the protest by deleting posts on Sina Weibo, China's version of Twitter, but some participants said they learned about it through WeChat, a popular app that is harder to censor.

Local officials, seemingly startled by the size of the protest, responded by holding a news conference, where the mayor promised to extend the public comment period by another 10 days. An academic made the case for the facility, but his language was impenetrable, and the angry protesters paid no attention. The local government posted a question-and-answer section about the planned uranium plant on its website, although many of the answers were lacking in substance (Jacobs 2013).

Shortly after the protest, authorities announced that they had scrapped plans for the plant. The *Global Times*, a Chinese tabloid, attributed the project cancellation to an "opaque and unreasonable" decision-making process and called on local governments to "establish a system that fosters consultations between officials and the public" (Zhu 2013).

This forced reversal by city officials shows the importance of involving stakeholders in decisions that affect them, regardless of the country's system of government.

Stakeholder Requirements for Successful Participation

Certain stakeholder characteristics can influence the success of interactions with the organization. These characteristics include the size and number of segments, their level of interest, and, most important, their level of hostility.

If stakeholders are widely distributed and encompass a number of diverse constituencies, each with its own perception of the risk and your organization (for example, the entire American populace), it can be extremely difficult to develop a single kind of stakeholder participation that will meet everyone's needs. Even including just one representative from each segment may require a committee with hundreds of people. Many types of stakeholder participation are limited to no more than 10 people to be effective (for example, focus groups). With more people, it becomes extremely difficult to come to any level of agreement (in the case of consensus communication) or even to have any kind of meaningful discussion (in the case of care communication or crisis communication planning).

With a stakeholder group whose representatives number in the hundreds, the forms of stakeholder participation that have a chance of being successful are formal hearings, multiple meetings held around the country or region of interest, and consensus-building committees run by an expert in conflict resolution. Technology can also make large-scale involvement feasible. See Chapter 18 for details.

Certain stakeholder characteristics—such as the size and number of number of segments, their level of interest, and, most important, their level of hostility—can influence the success of interactions with the organization.

Stakeholder participation can also be difficult if stakeholders are apathetic. If stakeholders truly care nothing about the risk, but your organization feels that the risk is real, you may need to raise awareness before you can effectively involve stakeholders in decision making or risk prevention.

Some people feel that silence or previous lack of involvement are signs of apathy. However, lack of attendance at meetings or lack of comments on documents may mean hostility, not apathy. Hostility is the primary obstacle to meaningful stakeholder participation. If stakeholders do not believe your organization and are angry about the way your organization is handling the risk assessment, risk management, or risk communication process, it may be difficult to develop meaningful relationships. On the other hand, effective stakeholder participation can be one of the best ways to reduce hostility, by showing that the organization does listen to and address concerns. In a situation with hostile stakeholders, interactions with small groups to build consensus and make decisions is the best choice. The worst choice in a hostile situation is a formal hearing because (1) the layout of the meeting exacerbates the "us versus them" mentality; (2) the formal hearing process is not conducive to having organizations inform stakeholders about how their concerns will be addressed or considered in the risk decision; and (3) communication tends to be one way.

The International Association for Public Participation, a professional organization dedicated to promoting and improving the practice of public participation, provides another way to consider what stakeholders may expect from meaningful participation. The organization developed a list of core values to guide stakeholder participation efforts, such as those for risk communication:

- The public should have a say in decisions about actions that affect their lives.
- Public participation includes the promise that the public's contribution will influence the decision.
- The public participation process communicates the interests and meets the process needs of all participants.
- The public participation process seeks out and facilitates the involvement of those potentially affected by or interested in a decision.

- The public participation process involves participants in designing how they participate.
- The public participation process communicates to participants how their input affected the decision.
- The public participation process provides participants with the information they need to participate in a meaningful way (adapted from IAP2 2000).

GUIDELINES FOR SPECIFIC TYPES OF STAKEHOLDER PARTICIPATION ACTIVITIES

Once you know what your organization will approve and what stakeholders need, you can determine which type of stakeholder participation will be most effective in your situation. For each of the types of participation mentioned earlier in this chapter, there are certain things you can do to help ensure success.

The Formal Hearing

Formal hearings are those in which the risk information is presented by a member of the organization, followed by formal testimony from members of the audience; an example is a scoping hearing for an environmental impact statement. These interactions tend to be primarily one-way communication and, hence, are often not very effective in involving stakeholders in risk assessment, risk management, or risk communication. In fact, some research indicates that formal hearings may increase participants' perception of risk and decrease their perception of the sponsoring organization's credibility (McComas 2001).

However, as mentioned earlier in this chapter, there are times when the formal hearing is a useful means of stakeholder participation (for example, when stakeholders are dispersed and encompass many segments). There are also times when the law appears to require that you hold such a hearing (for example, after a draft environmental impact statement has been released for public comment). (Note, however, that your organization can usually comply with the spirit of the law by holding workshops, open houses, or other less formal and more effective types of stakeholder participation.)

Formal hearings tend to be primarily one-way communication and, hence, are often not very effective in involving stakeholders in risk assessment, risk management, or risk communication.

If you must conduct a formal hearing, following certain guidelines can help ensure success:

- **Pick a time and place with which stakeholders have no associated negative feelings or even have associated positive feelings.** Choose a room large enough to hold everyone. Pick a time that will allow them to attend without missing work or key social functions. (For example, few people attended a hearing held on St. Patrick's Day in a town with a large Irish Catholic population, and those who did were hostile.)

- **Make sure that key decision makers attend.** Stakeholders often tend not to believe that an organization will do anything about their concerns and comments unless they see someone in authority at the meeting. This was illustrated by comments at several meetings concerning the potential dangers of hazardous-waste storage tanks. Although a number of concerns were expressed, the overriding comment was, "Why isn't the head of the organization here? We want to hear his views, and we want him to hear ours."
- **Get a good moderator.** Find one who (1) keeps the meeting on track without making anyone feel slighted, (2) can focus questions and concerns so that everyone understands them, and (3) is credible to the audience (which usually means one who is independent of the organization). We once listened to a moderator from a federal agency at a formal hearing address every member of the audience by name and provide seemingly sincere comments on their testimony. We were greatly impressed, until a woman seated in front of us leaned over to her companion and whispered, "She's so hypocritical! As if she really cares!" The moderator seemed to be doing everything right, and she still did not meet the needs of the stakeholders because, as a member of the organization, she had no credibility with the stakeholders.
- **Arrange for comments to be recorded.** In many cases, the legal purpose of a formal hearing is to record audience concerns. This recording can be done by using a digital recorder, a court stenographer, or a video recorder. Just taking notes or writing words on a flip chart is insufficient, although both are excellent supplementary methods; they show your audience that you are listening to them and noting their concerns. However, neither is sufficient to recall exact phrasing or underlying concerns at a later date.
- **Allow time for questions and answers.** Too many meetings are structured to allow the organization and audience to speak at each other, but not to interact. Typically, the organization spokesperson makes a presentation concerning the risk, then members of the audience take turns coming to the podium or microphone and expressing their concerns. Allow time between the organization's presentation and the audience's comments so that the audience can ask questions about the risk. Answers to these questions may allay some concerns, which you will not have to deal with later.
- **Respond to audience concerns.** As soon as possible after the meeting, make sure that those who attended and their constituencies know how their comments and concerns were used in making a decision about the risk. Often, organizations publish the transcribed comments, with coding or annotation by the organization to indicate how comments were addressed. Unfortunately, few people ever see such documents, leaving most of the

audience to wonder why they bothered, thus eroding your organization's credibility. It is better to contact each commenter personally, by phone, letter, or e-mail, to explain how their concerns were addressed. This can be a daunting job, given the hundreds to thousands of commenters at some formal hearings. Nonetheless, if your organization's credibility and the audience's level of hostility are important, you need to take the time and resources to do it.

Group Interactions

Group interactions generally require some sort of meeting. Much has been written about how to make meetings more effective. For risk communication purposes, there are several circumstances under which group interactions in meetings will not work:

- Data are confidential.
- The subject is trivial related to the overall risk.
- There is anger or hostility.
- The decision has already been made (Doyle and Straus 1976).

For the various types of group interactions (self-help groups, focus groups, workshops, or advisory committees), there are certain factors that help ensure success:

- **Pick a time when all members of the group can attend** and a place with which they have no associated negative feelings and, at best, with which they have associated positive feelings. Both focus groups and advisory committees should meet away from the organization if the group is independent or at the organization if it is more important to reinforce the feeling that the organization is really listening to them. For self-help groups, choose a meeting place that is conducive to sharing feelings (private, with comfortable furnishings).
- **Identify the purposes, objectives, and desired results at the beginning.** Make sure that both the group and the organization know why the group is meeting, what they hope to accomplish, any limitations to their scope or ability to make decisions, and the expected results. For example, with a group that is determining possible future land uses after the cleanup of a Superfund site, the purpose could be to explore possibilities and make recommendations to the organization. The objectives could be to meet regularly, divide the work among representatives, consult legal authorities and stakeholders, and develop recommendations based on information gathered. The results could be to present a report on their findings and recommendations to the organization by the end of a year.

- **Set clear lines of command and communication.** Who is in charge of the meetings, the organization's representative or the other members, perhaps on a rotating basis? How are decisions made, by written ballot, electronic voting, or show of hands? Do all members discuss the information and allow an elected leader to make the decision? Who mediates in the case of conflicts? Is consensus necessary or is it more important to capture the range of concerns and comments? Who presents the information from the group and to whom? Who presents the information from the organization and to whom? Develop a plan for how the group will function and make sure everyone involved with the group and from the organization agree to it.
- **Make sure that the organization shows support for the group.** Support can be shown by having someone from the organization whom the group respects attend the meetings; by providing resources such as funding, meeting space, and support staff (for example, to develop reports or provide guidance); or by sending letters of support to the group or outside organizations such as the press. This last suggestion will be meaningless if no one attends meetings and no resources are provided. (In situations in which stakeholders are particularly hostile, it can also undermine the credibility of the group, so consider the situation before following this advice.) If the organization does not show support, the group interaction will soon wither. If the organization does show support, the group interaction can be an extremely effective way to communicate risk information.

Researchers have also studied various group interactions to determine what makes these interactions effective. For example, researchers reviewed the work of a team of government agencies, contractors, Native American tribes, and stakeholders to evaluate potential risks to a major watershed from past releases from a nuclear facility. They found that perceptions of fairness and competence were key to process success. By fairness, they meant that everyone had the same opportunity to (1) determine the rules and the agenda, (2) speak and ask questions, and (3) access information and analysis. By competence, they meant the ability to understand language concepts and to agree on reality. Key problems that hindered the effort included the lack of attention to process rules, refusal of management to support decisions made by organization representatives, no formal dispute resolution mechanisms, and lack of mutually understood meanings of terms and concepts (Kinney and Leschine 2002).

Additional guidelines for specific types of group interactions can be found later in this chapter.

Self-Help Groups

The general purpose of self-help groups is to motivate stakeholders already aware of personal risky behavior (such as alcoholism or drug addiction) to prevent or address the risk in their own lives. Self-help groups can also assist stakeholders who are dealing with the aftermath of a crisis. In general, self-help groups should be led by a trained facilitator, often a psychologist or other health care provider. Those who are communicating risk can listen to concerns raised by the group and provide or develop information materials to answer specific questions (more information on developing information materials can be found in Chapter 13). Risk communicators can also assist the facilitator in finding ways to support the group members in managing the relevant risks.

> The general purpose of self-help groups is to motivate stakeholders already aware of personal risky behavior to prevent or address the risk in their own lives. Self-help groups can also assist stakeholders who are dealing with the aftermath of a crisis.

Focus Groups

Focus groups involve stakeholder representatives who meet for a specific purpose, usually for a specified period of time (a few hours to several months), for example, to evaluate the future land uses of a government Superfund site after it is cleaned up. Focus groups have been used in risk communication to explore risk perceptions, help develop content of risk messages, pretest risk communication messages and materials, select risk communication methods, develop alternative ways to manage a particular risk, and evaluate risk communication efforts (Desvousges and Smith 1988). As we use the term in this book, focus groups serve to inform those who are communicating risk to the wide variety of opinions, as well as the prevailing opinions, within a stakeholder group on a particular subject. Used in this way, their participatory nature is somewhat limited because information is still flowing in one direction. However, because the organization thought to ask stakeholder opinions, stakeholders sometimes perceive a greater degree of involvement than some other forms of one-way communication.

Focus group interactions require the use of a skilled moderator to probe attitudes and opinions on the specified topic. However, it is important that the moderator be independent—that s, the moderator cannot be perceived as an expert in the risk or the effort, or the meeting may turn into a question-and-answer session. Tasks or exercises are often used to focus discussion or identify perceptions (Desvousges and Smith 1988).

The key word is "focus." This applies to these groups in several areas:

> Focus groups have been used in risk communication to explore risk perceptions, help develop content of risk messages, pretest risk communication messages and materials, select risk communication methods, develop alternative ways to manage a particular risk, and evaluate risk communication efforts.
> —Desvousges and Smith (1988)

- **Focus membership.** Focus groups do not function well beyond about 10 members. More than that limits the amount of time each member can speak and may intimidate some members of the group, keeping them from speaking. If the stakeholder group is large and multifaceted, try holding several focus groups with specific characteristics. For example, you might meet separately with environmental group representatives, civic group representatives, and labor representatives.
- **Focus time.** Keep the meetings short and on schedule, preferably no more than 2 hours (Desvousges and Smith 1988). Nearly everyone who might belong to your focus group will have limited time to contribute. Make their time count, and they will be more likely to find the process useful.
- **Focus effort.** As mentioned previously, make sure that all members know the purpose of the meetings and how their comments will be used.
- **Focus results.** Make sure that you act on what you hear. Do not avoid problems that surface. And once you have acted or at least have a plan to act, let the wider group know how you are responding to their concerns.

Again, having a trained facilitator at a focus group meeting can help ensure meaningful results for both the group members and those who are communicating risk.

Workshops

Workshops are similar to focus groups in that the purpose of the meeting is specific (for example, to reach a decision on which alternative to propose to manage aircraft noise in a community near a busy airport). However, the nature of the workshop is more educational than participatory in that the stakeholders will be provided with presentations and information before conducting their evaluation. These presentations serve to ensure that all members of the workshop have a common language for the topic being discussed and a similar understanding of risk on which to build discussions. Another area that is frequently overlooked, however, is the development of a common understanding of the purpose of the workshop, the process the workshop deliberations are supporting, and how the results of the workshop will be used.

> The nature of the workshop is more educational than participatory in that the stakeholders will be provided with presentations and information before conducting their evaluation.

To develop the presentations for the workshop, follow the guidelines in Chapter 15 on speaking engagements. To develop information materials to supplement the presentations, follow the guidelines in Chapter 13. To set up the workshop, follow the general guidelines for group interactions earlier in this chapter.

Advisory Groups

An advisory committee is made up of stakeholder representatives who advise the organization about concerns, usually over a variety of subjects over an extended time. Advisory groups can be used in care, consensus, and crisis communication. Some government agencies use advisory groups in relation to environmental cleanup. For example, the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or Superfund) strongly suggests the use of citizen advisory groups and makes provisions for technical assistance grants to support these groups. Technical assistance grants provide citizen advisory groups with the resources to hire their own risk consultants to help them understand and respond to the information in a risk assessment. In addition, the Emergency Planning and Community Right-to-Know Act establishes emergency planning activities, many of which include citizen advisory groups. Federal guidance on bioterrorism preparedness planning also encouraged the development of advisory groups. Industry uses employee groups to advise on health and safety issues. Many industries have also developed their own citizen advisory groups to assist them in maintaining a positive relationship with local communities.

> Advisory groups can be used in care, consensus, and crisis communication.

The U.S. Department of Defense has established Restoration Advisory Boards (RABs), advisory groups for environmental restoration processes at specific military installations. A RAB includes representatives of the military installation, the U.S. Environmental Protection Agency, state and local governments, tribal governments, and the affected local community. RAB members share community views with the installation decision makers and report information back to the community on the military's environmental restoration activities. RABs are not decision-making bodies; they advise the military installation's commanding officer.

Since 1994, the Department of Defense has established more than 300 RABs in the United States and its territories. The website of the Defense Environmental Restoration Program contains many resources about RABs, including policies, guidance, operations manuals, and a directory of RABs operating nationwide (see Additional Resources in this chapter). The Department of Energy has established similar boards (Site-Specific Advisory Boards) at various sites where they are cleaning up the legacy from the Cold War.

Advisory groups usually meet for a longer time than other types of group interactions (except for some self-help groups that go on for years), requiring a large commitment of time from stakeholder participants. This time commitment often limits who can serve as members of these groups. There are two common ways around this limitation.

The first way is to find a method to compensate members for their time. For employees meeting on safety issues, the solution may be to make group membership an equal part of their job and ensure that they are paid for their time to attend meetings and provide information back to their fellow employees. For stakeholders outside the organization, the solution may be to make arrangements with their employers for time off as well as to pay them for their time. A drawback to this solution is that some members may look upon this pay as an entitlement and fight to stay in the group even when they are no longer in a position to contribute.

The second way to counter this limitation is to allow for a continuing rotation of membership so that no member has to spend excessive time in meetings. Members representing specific groups could serve for a quarter, a year, or a few years, depending on the frequency of group meetings. The drawback to this solution is that with continued membership turnover comes the need for continued education on the same issues, slowing the progress of the entire group.

Because of the popularity of these types of groups, much has been written as to characteristics of the group that ensure success:

- **Include members from across stakeholder groups.** In care communication efforts, this would include a member of each group at risk. For example, in developing an employee safety committee, you would need members who represent common classes of employees such as clerical, managerial, physical labor, and scientific/engineering/white collar workers. In crisis communication planning efforts, members could include representatives from all groups who will assist in emergency response efforts, both inside and outside an organization, for example, county and city governments, local firefighters, nonprofit organizations such as the Red Cross, and the news media. In consensus communication efforts, this could include representatives from each group with which consensus is sought. For example, advisory groups for environmental cleanup efforts often contain representatives of environmental groups, elected officials, business interests, regulatory agencies, Native American governments, and that nebulous group called "the public" (Serie and Dressen 1992). This latter group is the most difficult to recruit. Tactics include putting ads in the newspaper or online and contacting already organized groups with noncompeting agendas (for example, the local parent/teacher association might be able to identify a representative of the general public for an environmental cleanup effort but might be already deeply involved in an effort to reform the science curriculum in the education system).
- **Provide meaningful background information.** Some agencies seem to fear contaminating opinions if they share information beforehand. Advisory groups can benefit from broad overviews as well as specific technical data. They need to know agency constraints as well. It does not help the agency or its relationship with the advisory board if the group provides advice that cannot be acted upon for legal reasons.
- **Provide for independent technical advisors.** Regardless of whether the advisory group is chartered under Superfund (and thus can apply for a

technical assistance grant), advisory groups can benefit from having their own expert advisor. This advisor can serve to help clarify risk information and provide additional review and perspective to the risk assessment and management process. When the advisor and the organization in charge of managing the risk agree on the interpretation of risk data, the organization's credibility is enhanced. When they disagree, the disagreement points to areas that require additional information and communication. Edward Scher of the Massachusetts Institute of Technology's Department of Urban Studies and Planning and Sarah McKearnan of the Public Disputes Program of Harvard Law School suggest that, to be successful, these technical advisors must be credible with all segments of the stakeholder group, understand the process as well as the technical issues, guide but refrain from driving the interactions, and have the ability to work closely with participation facilitators (Scher and McKearnan 1997).

- **Spend time on team building.** Let the team members get to know each other so they are comfortable sharing opinions and information, and set up a process that allows you to hear all opinions, not just the most vocal ones.

Interactions Involving Risk Assessment

More and more, stakeholders are demanding to participate in how a risk is determined, for example, in how regulations are set for particular chemicals, preparations are made for public health emergencies, and risks are characterized in environmental cleanup decisions. Once, many scientists, engineers, and other decision makers would have balked at the thought of a layperson conducting complex risk analyses. However, the advent of widely available risk assessment models in the form of software that can be used on a personal computer has helped make such participation a reality.

> More and more, stakeholders are demanding to participate in how a risk is determined, whether and how regulations are set for particular chemicals, or in how risks are characterized in environmental cleanup decisions.

Stakeholders can access much of the raw data used by scientists and engineers to calculate risks. Government agencies have to make such information available, even if they do so unwillingly, as is often the case when a stakeholder group issues a Freedom of Information Act request. Industries that use hazardous chemicals must provide information on the types of chemicals and amounts to local communities when complying with the Emergency Planning and Community Right-to-Know Act. Some generic cancer registry information may also be available. With such raw data and a computer model, many stakeholder groups can calculate their own risk numbers, which, not surprisingly, may differ from those being issued by the organization in charge of assessing the risk because different assumptions and scenarios were used. When the two estimates differ by more than a small amount, the organization's credibility can be eroded, and subsequent risk communication efforts can be severely hampered.

It only makes sense, then, to assist stakeholders in their efforts to assess risk. Welcome the chance for an independent review (for that is what their assessment will be) of the risk assessment as an opportunity to improve the assessment. Meet with stakeholder groups from the beginning to identify assumptions, model limitations, and scenarios being developed. Whenever possible, incorporate their suggestions of assumptions and scenarios into your own risk assessment effort. When it is not possible (perhaps because of time or funding constraints or model limitations), explain why. Offer to provide training in the use of their chosen model. Allow them to view the data being input to your model and provide an overview of how your model functions. These steps will likely increase the similarities in the two risk assessments. However, even if the two estimates still differ, stakeholders will have a better appreciation for what you were trying to accomplish, and instead of open hostility, you are more likely to find a receptive audience to discuss the differences and to continue the risk communication effort.

Interactions Involving Decision Making

As noted by James Creighton, distinguished consultant on stakeholder involvement, the American public has increasingly demanded a bigger role in how decisions about risk are made (Creighton 1992). It is common to find regulatory agencies, other government agencies, and industry moving toward consulting with stakeholders before making key decisions regarding environmental, safety, and health risks. Most of the activities described in this chapter can be adopted to allow stakeholders to participate in decision making. Key considerations will be:

> The American public has increasingly demanded a bigger role in how decisions about risk are made.
> —Creighton (1992)

- **The scope of the involvement.** What does "stakeholder participation" mean for this decision? Will they provide criteria for ranking alternative ways to assess or manage the risk? Will they provide input on preferred ways to assess or manage the risk? Will they provide input on how various stakeholders might respond to different risk management strategies? Both the stakeholders and the organization in charge of managing the risk must agree on the exact parameters of involvement, or the effort will not succeed.
- **Results of the involvement.** What will happen once input has been received? The ultimate decision maker in most risk situations is the organization in charge of managing the risk, and these organizations seldom relinquish that power. Indeed, in the case of government organizations, laws and regulations prohibit the relinquishing of that power. For organizational

> credibility, and the success of the risk communication effort, it is vital that stakeholders understand where their decision-making power ends and the organization's begins.

The following subsections discuss specific types of stakeholder participation related to decision making involving risks. These types include facilitated deliberation and alternative dispute resolution.

Facilitated Deliberation

Facilitated deliberation usually refers to groups of people discussing issues and recommending solutions, led by a facilitator. Methods can be as casual as "Internet café" discussion groups and as formal as AmericaSpeaks electronic "21st Century Town Hall Meetings" involving thousands of citizens nationwide. For risk-related issues involving affected communities, two methods, Citizens Juries® and study circles, have been particularly useful.

Citizens Juries

The Jefferson Center, in Minneapolis, Minnesota, developed and trademarked the process known as the Citizens Jury. The Citizens Jury is designed to enable citizens to engage in informed discussions, generating findings for decision makers and the broader community. Randomly selected and demographically representative panels of citizens meet for several days using a prescribed, facilitated process to examine public policy issues and present their findings. The juries hear from "witnesses" in "hearings," deliberate on complex issues, and report their findings and recommendations.

Citizens Juries have been used for public policy issues of local, regional, or national importance. Risk-related issues have included comparing environmental risks, land use plans, agriculture and water policy, genetically modified food (Opinion Leader Research 2003), solid waste disposal (Jefferson Center 2001), and global climate change (Jefferson Center 2002). The Institute for Public Policy Research began its own series of Citizens Juries in the United Kingdom in the 1990s (Coote and Franklin 1999), with more than 100 projects conducted in Britain since 1996. Many other countries have adopted Citizens Juries as well. The Jefferson Center disbanded in 2002, but Citizens Juries continue in various forms.

Citizens Juries are useful for onetime decisions or input when intense discussion and deliberation occur over a condensed time period.

Citizens Juries have many similarities to advisory groups. They are independent of the organization that formed them. Sessions are open to observers, and the final report is in the public domain. The commissioning organization is expected either to follow the jurors' recommendations or to explain publicly why not.

Unlike most advisory boards, Citizens Juries are useful for one-time decisions or input when intense discussion and deliberation occur over a condensed time period. The planning process usually takes 3 or 4 months, but the deliberation process itself typically runs only 4 or 5 days. Jurors disband afterward, so they cannot address policy issues as they develop over time.

Study Circles

The study circle is another deliberation and problem-solving process. Groups of 8 to 12 people from diverse backgrounds and viewpoints meet several times to talk about an issue, often related to a community policy or need. They usually meet over a period of weeks or months and are guided by a trained facilitator. The emphasis is on examining an issue from many perspectives. The process does not require consensus but uncovers areas of agreement and common concern, ultimately generating strategies for action.

In a large-scale study circle program, people all over a neighborhood, city, county, school district, or region meet in diverse study circles over the same period of time. All the study circles work on the same issue and seek solutions for the whole community. At the end of the round of study circles, people from all the circles come together in a large community meeting to work together on the action ideas. According to the Everyday Democracy (formally the Study Circles Resource Center), more than 550 communities have instituted community-wide study circles since 1989.

> Study circle proponents say that the process sparks new connections between citizens and community leaders.

Risk-related topics in study circles have included community growth issues, land use, and neighborhood crime. Study circles involving nearly 400 people in Portsmouth, New Hampshire, prompted the city's Planning Board to endorse a 10-acre land purchase as public conservation habitat in 2003. Study circles of 350 people in Buffalo, New York, created programs such as "Walk and Park," whereby police officers park their cars for an hour a day to visit neighborhood businesses, and an anticrime program called "Putting the Neighbor Back in the 'Hood'."

Study circle proponents say that the process helps citizens gain ownership of the issues, discover a connection between personal experiences and public policies, gain a deeper understanding of their own and others' perspectives and concerns, create a greater ability to work collaboratively, and spark new connections between citizens and community leaders. The Everyday Democracy website contains resources to help communities institute study circles, including operations guidelines, facilitator training guidelines, evaluation forms, and best practices reports.

Alternative Dispute Resolution

Risk-related decision making often sparks conflicting points of view, sometimes leading to disputes. Alternative dispute resolution, in all its forms, represents ways to settle disputes without litigation or administrative adjudication, thus avoiding a solution that is imposed on the parties by an outsider. Research has shown that disputants often prefer alternative dispute resolution to the court process because of rapid processing, low costs, and the perception of the process being satisfying, fair, understandable, and ultimately resolving the conflict (Cook et al. 1980).

Federal and state statutes have enacted resolutions for alternative dispute resolution, and many agencies have implemented their own programs (Herring 2001). There is also online dispute resolution (Katsh and Rifkin 2001).

Alternative dispute resolution represents ways to settle disputes without litigation or administrative adjudication.

Three of the most commonly used methods of alternative dispute resolution are facilitation, negotiation, and mediation. All three use a neutral third party to facilitate an agreement. They typically share certain goals: allow voluntary participation by the disputants in a fair process, craft a creative and mutually satisfactory resolution, and enhance the parties' relationships while enabling them to save face (Renken 2002). All three methods have been used extensively in public participation processes involving risk. The following sections briefly summarize each method. Note that these definitions are fluid and somewhat interchangeable; even practitioners and professional associations disagree among themselves on what each method entails.

Facilitation

Facilitation uses a neutral third party to help groups accomplish their work by providing process leadership and expertise. Facilitators improve the flow of information and enhance mutual understanding. The facilitator remains impartial about the substantive issues under discussion and focuses on the communication process, leading the parties and providing procedural direction. A facilitator uses skills and techniques that enable the group to clarify issues, generate ideas, prioritize goals or solutions, and solve problems. If conflicts arise, the facilitator uses process skills to help people get past their individual agendas and get on with the group task.

Unlike other alternative dispute resolution techniques, facilitation does not usually involve caucuses (private meetings with the facilitator), except for initial meetings to launch the proceedings.

Facilitators improve the flow of information and enhance mutual understanding.

The International Association of Facilitators recommends the use of an independent facilitator (not a member of the group working on the task) under the following circumstances:

- When distrust, bias, or rivalry are present
- When participants have disparate educational, social, or economic status; are at different hierarchical levels; or are in relationships with significant power disparities

- When the task or problem is poorly defined or defined differently by various participants
- When group members all want to participate in the decision process rather than focusing only on the group process and logistics

The International Association of Facilitators offers a Certified Professional Facilitator credential and maintains a directory of certified facilitators by country and state. Certification is based on demonstrated competencies. These include the ability to create collaborative client relationships, plan appropriate group processes, create and sustain a participatory environment, guide the group to appropriate and useful outcomes, build and maintain professional knowledge, and model a positive professional attitude.

In risk communication, facilitation has been used extensively to address issues such as environmental cleanup, resource management, siting of facilities and electric transmission lines, and habitat restoration. Risk communicators typically serve in one of two roles. They may serve as the trained facilitator. They may also serve as the liaison who selects and/or recommends a facilitator and provides that person with background information and resources for the facilitation exercise.

NEGOTIATION

In negotiation, a third party helps the parties come to an agreement and may recommend a particular settlement. A long-established approach to negotiation considered it a "zero- sum" game, assuming that one party's gain is the other party's loss. But in the 1980s, Harvard Law School professors Roger Fisher and William Ury developed a highly regarded method called principled negotiation. It is based on the premise that it is possible to meet one's own needs and those of others and that conflict provides such opportunities (Fisher et al. 1991). Four principles define the method:

In negotiation, a third party helps the parties come to an agreement and may recommend a particular settlement.

1. People problems (negative emotions, differences in perceptions, and communication difficulties) are separated from substantial issues.
2. Positions are transformed into underlying interests.
3. Many options for gain are generated before deciding.
4. Mutually agreed-upon objective criteria are developed that are legitimate, practical, reciprocally applicable, and independent of each side's will.

Negotiators can be found and evaluated in the same manner as mediators; the following section suggests a process.

MEDIATION

Mediation helps people resolve or better manage disputes by reaching agreements about what the parties will do differently in the future. Originally adapted from labor/management negotiations, mediation is often used with families, businesses, schools, and workplaces, as well as with stakeholders in public policy issues. With the involvement of a neutral mediator, the parties identify the roles of the participants and ground rules, identify and discuss the problem, identify common goals and issues, generate options, bargain, and reach agreement. Private caucuses between the parties and the mediator may be used to build support or trust, explore settlement options, or break down barriers to negotiation in a confidential setting. The agreement is put in writing and signed by representatives of the parties, and it carries the same legal weight as any contract.

> Mediation helps people resolve or better manage disputes by reaching agreements about what the parties will do differently in the future.

The Alaska Judicial Council (1999) recommends the following process for selecting a mediator:

- **Identify your mediation goals.** What do you expect the mediator to do, based on the nature of the dispute and context for resolving it? Consider your budget and time frame. Mediator organizations can help you understand which services would be best for your situation.
- **Compile a list of names.** Mediator organizations often maintain listings by state, such as the Association for Conflict Resolution Mediator Directory.
- **Contact several mediators and request information.** This could include their promotional materials, resume, references, and a sample of their written agreements. Evaluate the materials in terms of training, experience, certification, and fee structure. Do they offer an orientation session after which the parties decide whether they want to continue?
- **Interview the mediators.** Your goal is to learn more about their training, knowledge, experience, style, confidentiality policies, logistics, and cost.
- **Compare among the mediators and decide.** You may wish to suggest two or three mediators so that all parties can agree on at least one.

Several programs and associations certify mediators. Some states and agencies also have their own certification requirements.

Environmental mediation, or environmental dispute resolution, as it is sometimes called, is a subset of mediation. Environmental disputes typically involve issues such as land use, agricultural and water rights, hazardous waste, tribal–state natural resource agreements, facility siting, and growth management. In South Carolina, for example, certified mediators throughout the state help citizens resolve disputes over environmental health and natural resources.

Government officials are increasingly turning to negotiators for assistance when attempting to build public consensus on permitting decisions, public project specifications, and natural resource allocations (Blacklocke 2001). In California, an environmental mediation process brought agreement on technical issues that had stalled an ecological risk assessment for Vandenberg Air Force Base for 2 years (Poncelet and Widman 2001).

Public participation and dispute resolution expert Jim Creighton cautions that environmental mediation can succeed only if the following conditions are met (Creighton et al. 1998):

- The parties have reached the point at which they no longer believe that they can impose their will on each other.
- The relative power of the interests is close enough that no one worries unduly about being exploited.
- The parties are convinced that they will achieve more through an agreement than by continuing to fight.
- The parties are well defined.
- The parties agree on the need for all of them to be at the table.
- The parties have the ability to commit their respective constituencies to the agreement.
- The agreement is binding.

An even more specific kind of environmental mediation is negotiated rule making or regulatory negotiation. It uses techniques of multiparty mediation to deal with large disputes over public policy. Representatives of stakeholder groups from industry, consumer and environmental organizations, and government agencies work with a mediator to negotiate government regulations. If they reach consensus, the agency can use the outcome as the basis for a proposed rule. The rule is still subject to public review and all other steps in the formal rule-making process.

The U.S. Institute for Environmental Conflict Resolution maintains a directory of specialists in environmental mediation.

Interactions Involving Risk Management

Risk management interactions involve stakeholders in managing the risk. In care communication involving personal risks to health and safety, those at risk are often the only ones who can manage the risk. Involving stakeholders in risk management is becoming more common in consensus and crisis communication too, for example, by having stakeholders collect and analyze environmental samples near a facility to determine whether contaminants are affecting the local area. Successful stakeholder participation in how a risk is managed is becoming more common, mostly because such interactions can be an extremely effective means of informing and raising awareness about a risk. To effectively involve stakeholders in managing the risk, certain guidelines should be followed:

Risk management interactions involve stakeholders in managing the risk.

- **Determine the purposes and objectives.** What do you want to gain by this interaction and how will you accomplish it? If your purpose is to inform your audience, a reasonable objective is to provide them with hands-on experience with the scientific assessment of risk. For example, they might join the scientists in running risk calculation models and explore how changes in various parameters equating to changes in lifestyles affect results. If your purpose is to raise awareness, your objective might be to show them how the risk is managed. For example, they might tour a facility under construction to identify safety features. If your purpose is to build consensus on the management of a risk, your objective might be to begin a dialogue on the issues at stake. For example, you might hold a workshop on strategies to communicate the dangers of drug addiction to teenagers. Each case will require slightly different arrangements.
- **Determine the scope of the interaction.** Exactly what will you have them do? If they will work in the field or laboratory, what will they be doing and who will be accountable for them? If they are working alongside management, who will determine what they can do within the organization and what information they are allowed to access? How long will they work? What will be the final product: a report to their constituencies, a press release, a journal article, a series of social media posts? Establishing this scope in the beginning will help you plan a meaningful interaction.
- **Make sure that those chosen to help manage the risk represent stakeholder groups.** Risk management interactions take a lot of time to set up. If the people you choose to help manage the risk do not represent stakeholders, the effort will be for nothing. No stakeholder will be interested in what they have to say unless they are credible.
- **Make sure that those chosen to help manage the risk are properly trained.** For safety reasons as well as for technical credibility, those who will be working with the risk must have the proper training. Allow them to attend the organization's training courses, or hold special sessions targeted to their needs.
- **Make sure that those chosen to help manage the risk are capable of disseminating information and that mechanisms and resources are available for them to do so.** For example, you might provide clerical assistance for an article by those involved in the risk management activity for a stakeholder newsletter or blog. The main reason for conducting this type of stakeholder participation is to share risk management information. The information will be far more credible if it comes from stakeholder members who have

been involved with the risk. If you disseminate the information on their behalf, it may have no greater credibility than if your organization gathered it. Make sure that the workers chosen are articulate and can write or speak well enough to present the risk to their peers in language that stakeholders will understand.

- **Show organizational support.** With this type of interaction, the organization must be heavily involved in planning, training, overseeing, and evaluating the workers. However, releasing press information, mentioning the workers by name in organization literature (if the workers agree to this), and even treating them to dinner with the organization's top management are good ways to show you appreciate their efforts. (But first make sure that the stakeholders or the workers will not see this last token of appreciation as the organization's paying off the workers.)
- **Watch out for union conflicts.** Some of the jobs assigned to these workers may fall under union rules. Discuss the importance of these workers with union representatives beforehand. If the union workers understand that the organization's future reputation and business depend heavily on the audience understanding of a particular risk, they are more likely to accept such encroachment on their areas of expertise.

Evaluating Stakeholder Participation Based on Your Situation

Table 17.1 lists advantages and disadvantages of the various types of stakeholder participation. The type of interaction you choose also depends on whether you are conducting care, consensus, or crisis communication. Table 17.2 shows which types of interaction are most effective for the three types of risk communication.

Table 17.1. Advantages and Disadvantages of Stakeholder Participation in Risk Communication

Type of interaction	Advantages	Disadvantages
Formal hearings	Are easy to implement; meet minimum legal requirements for some laws; allow geographically dispersed groups to participate	Can increase hostility; give time to only vocal concerns; leave some members of the audience dissatisfied; provide insubstantial involvement
Self-help groups	Motivate audience to act; empower audience	Will be effective only if audience can affect risk; require long-term commitment from both organization and stakeholders

(*continued*)

Table 17.1. (*Continued*)

Type of interaction	Advantages	Disadvantages
Focus groups	Are small scale and have well-defined purpose and time frame so they may be less intimidating to some organizations	Have limited scale and time; may not represent full audience; may not be substantial enough involvement for some stakeholders
Workshops	Educate as well as involve; gather disperse viewpoints	Require technical knowledge; require teaming between organization and stakeholders that may not be possible in hostile situations
Advisory groups	Have longer time frame so stakeholders can learn about risk; can help develop decisions	May be less effective over time; commit organization to respond; requires considerable resources (time, money, staff)
Risk assessment interactions	Provide credible review of process; increase chances of acceptable assessment	Require technical knowledge; feel too much like "challenge" to some technical experts
Decision-making interactions	Can lead to more acceptable decision; are highest form of involvement	Require organization to relinquish some control; may not be legal in some situations
Risk management interactions	Teach stakeholders about risk; empower them	Require technical knowledge; will be effective only if audience can affect risk

Table 17.2. Effective Stakeholder Participation for Care, Consensus, and Crisis Risk Communication

Level of effectiveness	Care communication	Consensus communication	Crisis communication[a]
Most effective	Self-help groups; risk management interactions	Decision-making interactions; advisory groups; workshops; risk assessment interaction	Focus groups
Moderately effective	Focus groups	Focus groups; risk management interactions	Self-help groups
Least effective	Formal hearings	Formal hearings	Formal hearings

[a] Stakeholder participation cannot be conducted during a crisis unless the interaction has been planned months in advance. If planned, focus groups can meet quickly to help those who are communicating the risk to understand the needs of the audience and to disseminate information. Self-help groups can be used after the crisis to help the audience come to terms with what has happened.

CHECKLIST FOR STAKEHOLDER PARTICIPATION

- ☐ The involvement starts early and runs throughout the risk assessment and management process.
- ☐ The organization is committed to providing stakeholder participation. The type of stakeholder participation was chosen based both on:
  - ☐ Organizational needs
  - ☐ Stakeholder needs
- ☐ There is a written plan for the interaction.

For formal hearings:

- ☐ The time and place are comfortable to the audience.
- ☐ Key decision makers have been invited to attend.
- ☐ The services of a good moderator have been arranged for.
- ☐ Comments will be recorded.
- ☐ Time has been allowed for questions and answers.
- ☐ How audience concerns were used in the risk decision will be communicated to them after the meeting.

For group interactions:

- ☐ The time and place are comfortable to participants.
- ☐ The purpose and objectives of the group have been agreed upon.
- ☐ The lines of communication have been defined.
- ☐ The group has decided how it will operate.
- ☐ Someone credible from the organization will attend.
- ☐ The organization will provide resources.
- ☐ Technical support has been provided.

For self-help groups:

- ☐ The group is led by a trained facilitator.
- ☐ Additional information has been made available to meet audience needs.

For focus groups:

- ☐ The moderator is seen as independent.
- ☐ There are no more than 10 members who represent stakeholders.
- ☐ Each meeting lasts no longer than 2 hours.

☐ The group has an agreed-upon purpose.
☐ The group knows how its comments will be used.

For workshops:

☐ Guidelines for speaking engagements have been followed for presentations.
☐ Guidelines for information materials have been followed for those materials.
☐ Guidelines for group interactions have been followed.

For advisory groups:

☐ The organization has developed a mechanism to manage time commitments.
☐ The group includes members from across stakeholder constituencies.
☐ The group has a credible technical advisor.

For risk assessment interactions:

☐ Assumptions, limitations, and scenarios for the assessment have been related to stakeholders.
☐ Stakeholder assumptions and scenarios have been included when possible and an explanation provided when it was not possible.
☐ The stakeholders have been offered training in model use.
☐ The stakeholders have viewed the data being input to the model.
☐ The model functioning has been explained to the stakeholders.

For decision-making interactions:

☐ The scope of involvement has been delineated.
☐ Stakeholders know how their input will be used in the decision.

For risk management interactions:

☐ The purposes and objectives are clear to all involved.
☐ Scope has been determined and agreed upon.
☐ Those who are working represent the audience.
☐ Workers have received the appropriate training.
☐ Workers are capable of disseminating risk information.
☐ The organization will show support for the workers.
☐ The union has been consulted about possible conflicts.

REFERENCES

Alaska Judicial Council. 1999. A Consumer Guide to Selecting a Mediator. Anchorage, Alaska. http://www.ajc.state.ak.us/reports/MediatorGuide.pdf (accessed October 17, 2017).

Aleknavage, J. and B. Lyon. 1997. “Citizens and Manufacturers Work Together.” *ChemEcology*, June–July: 7–9.

Arvai, J. L. 2003. “Using Risk Communication to Disclose the Outcome of a Participatory Decision-Making Process: Effects on the Perceived Acceptability of Risk-Policy Decisions.” *Risk Analysis*, 23 (2): 281–290.

Beierle, T. C. 2002. “The Quality of Stakeholder-Based Decisions.” *Risk Analysis*, 22 (4): 739–750.

Blacklocke, S. 2001. *“Alternative Environmental Dispute Resolution in South Carolina: Emerging Opportunities to Build More Sustainable Communities.”* http://www.mediate.com/articles/blacklocke.cfm (accessed October 17, 2017).

Commission (Presidential/Congressional Commission on Risk Assessment and Risk Management). 1997. *“Risk Assessment and Risk Management in Regulatory Decision-Making.”* Commission, Washington, DC.

Cook, R., J. Roehl, and D. Sheppard. 1980. *Neighborhood Justice Centers Field Test: Final Evaluation Report*. U.S. Government Printing Office, Washington, DC.

Coote, A. and J. Franklin. 1999. “Negotiating Risks to Public Health—Models for Participation.” In P. Bennett and K. Calman, eds., *Risk Communication and Public Health*. Oxford University Press, Oxford, UK, pp. 183–194.

Creighton, J. 1992. “What Does It Take for a Decision to ‘Count’?” Presentation to the U.S. Department of Energy, Richland Operations Office, Richland, Washington. Creighton and Creighton, Palo Alto, California.

Creighton, J. L., C. M. Dunning, J. Delli Priscoli, and D. B. Ayres, eds. 1998. *Public Involvement and Dispute Resolution: A Reader on the Second Decade of Experience at the Institute for Water Resources*. Institute for Water Resources, U.S. Army Corps of Engineers, Alexandria, Virginia.

Desvousges, W. H. and V. K. Smith. 1988. “Focus Groups and Risk Communication: The ‘Science’ of Listening to Data.” *Risk Analysis*, 8 (4): 479–484.

Doyle, M. and D. Straus. 1976. *How to Make Meetings Work*. Wyden Books, Chicago, Illinois.

Fisher, R., B. Patton, and W. Ury. 1991. *Getting to Yes. Negotiating an Agreement Without Giving In*, 2nd ed. Penguin Books, New York.

Henry, R. A. 2000. *You’d Better Have a Hose If You Want to Put Out the Fire: The Complete Guide to Crisis and Risk Communication*. Gollywobbler Productions, Windsor, California.

Herring, M. 2001. “Summary of State Alternative Environmental Dispute Resolution Institutions.” http://mediate.com/articles/scsg1.cfm (accessed October 17, 2017).

IAP2 (International Association for Public Participation). 2000. “Core Values for the Practice of Public Participation.” http://www.iap2.org/?page=corevalues (accessed October 17, 2017).

Imholz, R. M., T. B. Hindman, and D. M. Brubaker. 1990. "Lessons Learned from Applying External Input to DOE Policy Decision Making." In *Proceedings of the International Topical Meeting on Nuclear and Hazardous Waste Management, Spectrum '90*. American Nuclear Society, La Grange Park, Illinois, pp. 12–15.

Jacobs, A. 2013. "Rare Protest in China Against Uranium Plant Draws Hundreds." New York Times, July 12, 2013.

Jefferson Center. 2001. Citizens Jury®, Metro Solid Waste, June 18–22. St. Paul, Minnesota. Jefferson Center, Minneapolis, Minnesota.

Jefferson Center. 2002. Citizens Jury®, Global Climate Change, March 18–22. Baltimore, Maryland. Jefferson Center, Minneapolis, Minnesota.

Kasperson, R. E. 1986. "Six Propositions on Public Participation and Their Relevance for Risk Communication." *Risk Analysis*, 6 (3): 275–281.

Katsh, E. and J. Rifkin. 2001. *Online Dispute Resolution: Resolving Conflicts in Cyberspace*. Jossey-Bass, San Francisco, California.

Kinney, A. G. and T. M. Leschine. 2002. "A Procedural Evaluation of an Analytical–Deliberative Process: The Columbia River Comprehensive Impact Assessment." *Risk Analysis*, 22 (1): 83–100.

McComas, K. A. 2001. "Public Meetings and Risk Amplification: A Longitudinal Study." Presented at the Society for Risk Analysis Annual Meeting, December 2–5, 2001, Seattle, Washington.

NRC (National Research Council). 1996. *Understanding Risk: Informing Decisions in a Democratic Society*. National Academy Press, Washington, DC.

Opinion Leader Research. 2003. "FSA Citizens' July: Should GM Food Be Available to Buy in the UK?" Final Report. Prepared for the Food Standards Agency, London.

Poncelet, E. C. and G. Widman. 2001. *Better Together: Mediating an End to an Ecological Risk Assessment Dispute at Vandenberg Air Force Base.* http://www.mediate.com/articles/poncelet.cfm (accessed October 17, 2017).

Renken, D. 2002. *The ABC's of ADR. A Comprehensive Guide to Alternative Dispute Resolution*. http://www.mediate.com/articles/renkenD.cfm (accessed October 17, 2017).

Scher, E. and S. McKearnan. 1997. "Do's and Don't's from a Philadelphia Story: How to Find Helpful Expert Advice." Consensus, April 1997, No. 34, pp. 1, 8, and 12. MIT—Harvard Public Disputes Program, Cambridge, Massachusetts.

Serie, P. J. and A. L. Dressen. 1992. "Creating a Context for Public Confidence in Environmental Remediation Programs." In *ER '91, Proceedings of the Conference for the U.S. Department of Energy*, U.S. Department of Energy, Washington, DC. pp. 31–35.

Zhu, C. 2013. "Public Trust Crisis Threatens China's Nuclear Ambitions." *Scientific American*. https://www.scientificamerican.com/article/public-trust-crisis-threatens-china-nuclear-power-expansion/ (accessed August 20, 2017).

ADDITIONAL RESOURCES

American Bar Association Section on Dispute Resolution. https://www.americanbar.org/groups/dispute_resolution.html (accessed October 17, 2017).

Association for Conflict Resolution. http://www.acrnet.org (accessed October 17, 2017).

Carpenter, S. L. and W. J. D. Kennedy. 2001. *Managing Public Disputes: A Practical Guide for Government, Business and Citizens' Groups*. John Wiley & Sons, Inc., New York.

CR Info: The Conflict Resolution Information Source. http://www.beyondintractability.org/ (accessed October 17, 2017).

Defense Environmental Restoration Program. http://www.denix.osd.mil/derp/about/ (accessed October 17, 2017).

Everyday Democracy. https://www.everyday-democracy.org/ (accessed October 17, 2017).

Imholz, R. M., G. E. Rubery, and D. M. Brubaker. 1992. "Case Studies on Designing Meetings for Effective Institutional Interactions." In *ER '91: Proceedings of the Environmental Restoration Conference for the U.S. Department of Energy*. U.S. Department of Energy, Washington, DC, pp. 27–30.

International Association of Facilitators. http://www.iaf-world.org (accessed October 17, 2017).

Jefferson Center. http://www.jefferson-center.org (accessed October 17, 2017).

Lynn, F. M. and G. J. Busenberg. 1995. "Citizen Advisory Committees and Environmental Policy: What We Know, What's Left to Discover." *Risk Analysis*, 15 (2): 147–162.

National Association for Community Mediation. http://www.nafcm.org (accessed October 17, 2017).

National Center for Information Technology and Dispute Resolution. http://odr.info/ (accessed October 17, 2017).

National Coalition for Dialogue and Deliberation. http://ncdd.org/ (accessed October 17, 2017).

Moore, C. W. 2003. *The Mediation Process: Practical Strategies for Resolving Conflict*, 3rd ed. Jossey-Bass, San Francisco, California.

Rowell, R., P. Sheikhattari, T. M. Barber, and M. Evans-Holland. 2009. A Guide to Enhance Grassroots Risk Communication Among Low-Income Populations. Morgan State School of Community Health and Policy, Baltimore, Maryland. http://serve.mt.gov/wp-content/uploads/2010/10/A-Guide-to-Enhance-Risk-Communication-Among-Low-Income-Populations.pdf (accessed August 20, 2017).

Udall Foundation's U.S. Institute for Environmental Conflict Resolution. https://www.udall.gov/OurPrograms/Institute/Institute.aspx (accessed October 17, 2017).

18

TECHNOLOGY-ASSISTED COMMUNICATION

Technology gives us almost unlimited options for risk communication. Digital content raises risk awareness and provides options to mitigate risks. Telebriefings and streaming audio and video convey risk information quickly to media outlets and consumers. Data-gathering and measurement devices upload content to reveal risk information for decision making. Through virtual worlds, users practice their skills in emergency response scenarios and other risk-related activities. Electronic forums invite stakeholders to comment on risk decisions, computer models help them calculate their own risks, and group software aids decision-making processes.

Yet technology applications are not always superior to other forms of communication; in fact, they can be less useful and more expensive. Advantages and disadvantages of technology-based applications are discussed in Chapter 10. This chapter discusses how to choose technology applications based on objectives and provides advice on how to use these applications when communicating risk in the workplace and in care, consensus, and crisis communication efforts. All web addresses given here were correct at the time of publication.

Risk Communication: A Handbook for Communicating Environmental, Safety, and Health Risks,
Sixth Edition. Regina E. Lundgren and Andrea H. McMakin.
© 2018 The Institute of Electrical and Electronics Engineers, Inc., and Regina E. Lundgren
and Andrea H. McMakin. Published 2018 by John Wiley & Sons, Inc.

See Chapter 19, Social Media, for the use of social networking sites; blogs and podcasts; tweeting, video, image, and file-sharing sites; and mapping in risk communication.

CHOOSING TECHNOLOGY-BASED APPLICATIONS

As with any form of risk communication, purpose and objectives should be the key factors in choosing technology-based applications to communicate risks. Table 18.1 gives some examples.

Audience needs are another important consideration. Participants must have access to equipment and software and know how to use them efficiently. Pretesting the application with target audiences is critical. This is especially true in situations in which people will be using the technology on their own, without a person there to answer questions or facilitate the process.

A third consideration is the medium itself. Technology-based applications should be designed to use the characteristics specific to that medium. For example, websites should use navigation patterns that enable people to go immediately to particular sections of interest and drill down for more detail if desired. In computer-based training, immediate feedback about right and wrong answers should be provided to users when possible. Alerting messages to employees and others during an emergency should be updated frequently, keeping people continually up-to-date. On the other hand, computer-based applications should not be relied on as the

Table 18.1. Communication Objectives and Corresponding Technology-Based Applications

Risk communication objectives	Potential technology tools
Provide safety and health training	Computer-based training or course work, virtual worlds
Keep people informed about risks, including during and after emergencies	E-mail, shared databases, shared file space, alerts on mobile devices
Provide current risk information	Websites, e-mail, listservs, telebriefings, social media, kiosks, streaming audio and video, content delivered to mobile devices
Share information and receive feedback from interested individuals about a particular risk (participatory process)	Internet, e-mail, local area networks, shared file space, computers in central areas, designated channels on social media. Tools must have a feedback feature or at least a point of contact to receive comments and discuss issues
Compile and analyze public comments	Tailored software, designated web space
Support group decision processes	Tailored software or software/hardware combination with facilitator

primary source to communicate crisis information in situations such as natural disasters because electrical power and infrastructure may be lost.

The following sections suggest ways to use technology to communicate about risks.

Technology tools should be designed specifically to use the characteristics of the medium, rather than merely substituting for another medium.

For advice about how to design or adapt tools for specific situations, work with a technology specialist. The Additional Resources section at the end of this chapter lists helpful materials that provide more detail on each application described here.

WORKPLACE RISK COMMUNICATION

Risk-related communication to employees often fits into two categories: (1) ensuring that workers receive required training, and (2) keeping employees informed about current health, safety, and environmental issues, including emergency situations.

Computer-Based Training

Computer-based training is a broad term encompassing everything from self-paced online or cloud-based programs and tests to interactive, real-time multimedia training that links people and instructors in dispersed geographic locations, including virtual worlds. Computer-based training, whether live or on-demand, can be a cost-effective, consistent, fast, and relatively easy way to impart information about risks and to test employee knowledge of what to do on the job. Common risk-based training topics are equipment operation, handling hazardous chemicals, fire safety, and general office safety.

Computer-based training can be a cost-effective, consistent, fast, and relatively easy way to impart information about risks and to test employee knowledge of what to do on the job.

A typical example is a software program developed by researchers at Oregon Health and Science University to improve workplace safety and to decrease the number of on-the-job injuries. Kent Anger, associate director of applied research at the Center for Research on Occupational and Environmental Toxicology, created the program to train employees in physically demanding jobs such as field agriculture, food preparation, painting, and building maintenance. Often, these employees have limited education or limited English skills. When workers do not read English or are intimidated by computers, teaching them standard safety procedures to protect themselves can be a challenge. Anger's creative use of technology is addressing this problem.

Some organizations use live online training, where a group of people in various locations receive simultaneous training via their desktop computers or mobile devices, linked to an instructor. These can be webinars or remote sessions using Skype or other teleconference options. The trainees can watch and listen in real time as the instructor shows and demonstrates information onscreen. Trainees can practice the exercises online and talk with the instructor and each other via teleconference or through an online chat feature during training. Web cameras can be used to show students what the instructor is doing and in some applications, trainees can show their screens as well. The instructor can share additional resources that all trainees download to their computers for later reference. Don Clark, a specialist at Pacific Northwest National Laboratory, recommends the following guidelines for live online training:

- People typically cannot stay engaged in online training for more than an hour at a time, so keep the training short or split it into several sessions. Include frequent interactive exercises, such as online quizzes or question-and-answer sessions.
- Trainees should be in quiet locations, ideally rooms where the doors can be shut. The background must be quiet enough so that all participants can hear each other; any ambient noise is transmitted to everyone on the conference call. Or, the leader can mute the audience until the scheduled interaction periods begin.
- Trainees must prepare in advance not to be interrupted during training. Unlike the seclusion of a traditional classroom, employees are sitting at their desks or teleworking locations, and other people may unknowingly drop by while training is in process. People who answer multiple phone lines should arrange to forward the calls or to use a different workstation so they will not constantly have to break away to answer calls.

Distance education enables learners to obtain instruction on their own time, at their own sites.

Distance education is another application for the Internet. Distance education enables learners to obtain instruction on their own time, at their own sites. Depending on the setup, instructors and students can do projects, discuss issues, and share assignments and tests via the Internet, e-mail, various forms of shared file space, or shared multimedia spaces. One example is the Oak Ridge Institute for Science and Education, which provides a variety of courses and certifications on safety and health risk management. They use a variety of technologies, including satellite uplink and downlink transmissions, video conferencing, and use of company websites and intranets.

As in any kind of training, it is important to build a strong foundation. This includes researching the applicable regulations and laws that apply, determining

Some kinds of training are best conducted in a traditional classroom environment.

the organization's responsibilities in specific training areas, understanding what employees know and need to know, identifying training objectives and effective ways to impart information via technology, pretesting the training materials, and evaluating success.

Remember that some kinds of training, in which an instructor needs to watch someone do something or students need to practice a hands-on skill, are still best conducted in a traditional classroom or field environment. Some training works well as a hybrid. For training equipment operators, for example, students could use an online course to understand the basics, and then classroom meet as a group to practice operating actual equipment under the guidance of an instructor.

When adding a new computer-based training program or replacing a traditional program with a computer-based one, trainers often must justify the increased technology cost to management by showing a return on investment. Typical benefits measured are reduced travel and labor costs, delivery to more people in a shorter time, and automation of testing and scores. Of course, computer-based training, as with all training, should also measure learning outcomes such as changes in knowledge, skills, job performance, and/or business impact.

In developing risk-related computer-based training, additional factors must be considered:

- **Be aware of the possibility of generating or increasing hostility.** Some off-the-shelf computer-based training and some in-house developed applications have obviously been created with little knowledge of risk communication principles. Watch for inappropriate risk comparisons, technical jargon, downplaying of nontechnical or opposing viewpoints, and other factors that may inadvertently generate or increase audience resentment, thereby reducing the chance that the risk communication effort will be successful. If you are developing the training course yourself, always pretest it before giving it to employees as a final product. A group of nuclear subject matter experts developed an example of good and poor risk communication for a training session being given to employees at a nuclear facility. While a team of risk communicators vetted the script, when it came time to film, the nuclear experts took a few logical shortcuts to save time and filming costs. Unfortunately, these shortcuts involved leaving out key actions employees regularly took on the job, such as being able to call a "time out" when they spotted a safety problem. When the film was first aired during a dry run of the course, the employees being trained were so fixated on the procedural inaccuracies that they could not "hear" the risk communication messages.
- **Tailor off-the-shelf courses.** While many large organizations create their own computer-based training courses, smaller organizations often rely on

courses developed by others. Supplement these off-the-shelf courses with information materials, presentations, and other forms of risk communication to ensure that the training fully meets the needs of the participants and reflects organization-specific information.

Dozens of professional and academic organizations can provide additional guidance and resources on distance and e-learning. At the time of this book's publication, some of those organizations included the Association for Talent Development, the United States Distance Learning Association, the Distance Education Accrediting Commission, and the European Distance and e-Learning Network.

Case Study: GE Training Touts "Gym for the Mind"

How do you help a workforce adapt to change? GE Power, a global energy powerhouse, launched an innovative internal program to help its employees up their digital game.

The energy industry, especially electricity delivery, is sometimes slow to adopt new technologies. It also has an aging workforce: 25% of employees will reach retirement age in the next 5 years, according to GE communications leader David McCulloch (2017). Yet GE aspired to move the company increasingly into digital and analytics products.

Most of GE Power's 60,000 employees didn't realize what digital could do for them, for GE's business, and for the industry as a whole. McCulloch also recognized that many of these "nondigital" employees were in front of their customers every day, and therefore crucial to telling the company's story about GE's digital future.

McCulloch and his team created an employee communication strategy, called Digifit, that encompassed education, engagement, and enthusiasm. Positioned as a "gym for the mind," Digifit combines videos, gamification elements, and live events to help strengthen the idea of digital training as entertaining and gratifying, and to encourage all employees to progress through the entire program.

McCulloch states that feedback and outcomes were overwhelmingly positive, with active engagement levels at 22%, more than double the typical engagement level for employee-facing campaigns.

This example demonstrates the importance of understanding how to use online training and other communication tactics strategically to reach and engage employees.

Informing Employees about Risks

In organizations in which most employees have access to a networked computer, certain risk-related information can be effectively and quickly disseminated. One common way is to warn employees of potential upcoming risks so that they can prepare themselves. For example, through all-staff e-mail messages, text messages, and/or instant message alerts, workers can be alerted to approaching storm fronts and told to leave work early to avoid hazardous weather.

All-staff e-mail bulletins or electronic newsletters also can be used to remind workers to follow certain safety procedures, or that a safety audit or fire drill is coming up and what they should expect. When sending all-staff messages, consider the following:

Keep the message short. As one information specialist put it, "If they have to scroll, they won't."

- **Keep the message short.** As one information specialist put it, "If they have to scroll, they won't." Keep information brief and easy to scan on desktop and mobile devices. Consider topical headings so that staff can get an overview quickly.
- **Tell them why they should care.** As close to the front of the message as possible, state why this message is important. Some employees receive several hundred e-mail messages each day. Even one from the president of the company is less likely to stand out in such a crowd. Give them a reason to continue reading.
- **Give them direction.** Let employees know what is expected of them. Do you want them to take some action? Do you want them to be more aware of an issue? For what purpose? Explaining what you expect of them will help them see the value of the message as well as encourage a response.
- **Always provide a point of contact for additional information**. You can't cover everything employees will want to know in one message. Always provide a source for staff who need more information.

Another way companies use e-mail is to keep employees informed after an accident or other unforeseen event has occurred; in other words, in-house crisis communication. After a chemical release, for example, a company may tell its employees what happened, define any known health or environmental consequences, and explain what is being done to rectify the situation. This kind of message usually comes from the president or other high-placed official. Often, a contact name and phone number are given so that employees may get more information. It's also important to tell staff when the risk has been mitigated or corrected.

It is all too easy to give people enormous amounts of information via computer without making sense of it. Prioritize information and evaluate its usefulness to users on a regular basis.

One possible disadvantage of using e-mail is the potential spreading of sensitive information. Company officials should assume that anything they send to employees via computer can be distributed outside the company, including to the media.

With employees using the cloud or other file-sharing platforms, the challenges associated with data security have increased. No organization wants its private records of employee accidents or health status, for example, to be shared inadvertently or stolen. Organizations of all sizes should have data security policies in place, train employees on them, and monitor usage. Training should cover guidelines for the access, use, dissemination, storage, and removal of company information from various platforms and devices. Some companies take steps such as blocking unapproved sharing platforms or requiring use of a corporate cloud.

For environmental, health, and safety issues that have a longer life, some organizations also use online discussions. This approach often involves shared file space, such as Intranet sites or online question-and-answer forums. Employees can have informal discussions on particular topics, or, more formally, pose questions that are then answered by designated people in the company that everyone can see.

Organizations that work with hazardous materials need to comply with employee communication requirements such as those set by the Occupational Safety and Health Administration (OSHA). A written hazard communication program is required. Employers must explain chemical and physical risks in the work environment to employees, including the use of Safety Data Sheets that explain the risks of various chemicals and mitigation measures to prevent injury. Chapter 3 provides more information.

WEB-DELIVERED AND STAND-ALONE MULTIMEDIA PROGRAMS

Consumers are increasingly expecting risk information in multimedia formats. The use of digital tools makes risk information and discussions more salient, immediate, and interactive than ever. Examples include online multimedia tools, mobile platforms, web and satellite broadcasts, and emergency planning and training programs.

Online Multimedia Tools

Online multimedia tools combine video, graphics, text, animation, virtual tours, interactive tools, and other options. Users control the flow of information and can move around to various topics of interest. Many organizations provide audio and video programs online. For example, the OSHA website offers stand-alone, interactive, web-based training tools on occupational safety and health topics ranging from ammonia refrigeration to youth in agriculture. Some use expert system modules, which enable the user to answer questions and receive reliable advice on how OSHA regulations apply to their work site.

Many online tools are interactive and customizable. One example is the iCanDecide online interactive treatment decision tool, which helps patients diagnosed with early-stage breast cancer. The iCanDecide tool presents patients with multiple hypothetical treatment scenarios that allow them to score treatments based on their preferences. Patients get feedback on their preferences based on common themes across the ranked scenarios. A study showed that the tool was better than static online information for preparing patients to make complicated decisions regarding their care, both in knowledge and in feeling prepared for decision making (Hawley et al. 2017).

Researchers from the University of Leicester, England, developed the InterPreT Cancer Surival tool, an interactive tool to help scientists, health care professionals, patients, and the public understand and interpret different statistics on cancer survival (CareAppointments 2017). The tool allows users to examine survival rates for people with melanoma and cancers of the colon, breast, lung, prostate, and rectum based on the age and sex of the individual. In another mode of interaction, the American Cancer Society and other organizations provide online live chats with experts about health risks.

Another example is Your Disease Risk, an online tool of Barnes-Jewish Hospital and Washington University School of Medicine. On the website, users can find their risk of developing common diseases and get personalized tips for preventing them. A number of online smoking cessation programs use customizable online tools for self-monitoring of behaviors, social support, and reinforcement timed to match enrollees' efforts to quit.

The website of the U.S. Transportation Security Administration contains a "myth busters" page that responds to specific public perceptions. Examples of rumors that the organization has addressed include officers hassling traveling children, a federal air marshal shortage, and reporters being placed on the agency's "watch list" for travelers.

Take advantage of the interactive, multimedia nature of the medium, including audio, video, movement, sound, and interactive exercises as appropriate.

More medical providers are using a variety of online multimedia tools for personalized communication. In one example, a "virtual nurse," who explains a discharge plan to hospital patients, was found to cut down on readmissions while reducing medical costs (Landro 2011). Appearing on a computer screen wheeled up to the patient's bedside, "Louise"—a name chosen by focus groups—reviews the discharge packet that the patient is holding. Patients react by using a touch screen, including asking for information to be repeated.

If you have online information that would be useful elsewhere, consider widgets. Widgets are online applications on one website that can be "pulled" and displayed by another website. The U.S. Centers for Disease Control and Prevention (CDC) makes widgets available on its website for seasonal flu updates, public health statistics, and other topics of high interest. Once an organization has added a widget from someone else's site to its own site, there is no technical maintenance required because the providing organization updates the content automatically.

In creating web or stand-alone programs, make sure that they can be used as intended by the target audience. Take advantage of their interactive, multimedia nature, including audio, video, movement, sound, and interactive exercises as appropriate. Make sure that the tool works properly on all standard computer platforms, including mobile, and with all standard web browsers.

Specify the program duration. It helps to include a website that contains more information about the subject of the program and a way to contact the organization for more information and troubleshooting.

If posting video on your organization's website, make sure that the infrastructure can handle the bandwidth required.

Provide indexes, summaries, and other navigational cues in computer-based information, even more than you would in a hardcopy document.

Mobile Platforms

Here, we define mobile platforms as a service or application that involves voice or data communication between a central point and remote locations. It includes the use of mobile phones, tablets, and other devices.

These applications are enabled by the characteristics of mobile networks and devices: near ubiquitous in many countries, locatable, connected by user interface devices, often personalized, delivering computing power at low cost, integrating a range of sensors, and supporting mobility.

Many such applications are useful for public and individual care communication, particularly in the health fields. Health applications range across remote diagnostics and monitoring, self-diagnostics, management of long-term conditions, clinical information systems, targeted public health messaging, data gathering for public health, hospital administration, and supply chain management (Freng et al. 2011). There are thousands of health care applications from independent developers for mobile devices. Some of these use cell phones to distribute and transmit information about disease incidence and reporting. Some provide diagnosis and treatment via around-the-clock telemedicine.

A typical example is the T2 Mood Tracker, launched by the U.S. Department of Defense's National Center for Telehealth and Technology in 2010. It is an application for smart phones and other wireless devices to help military personnel who have been deployed to track their mood and stress levels—although it has since become popular for nonmilitary users as well. Users have a touch screen with a visual scale to track their own anxiety, depression, general well-being, life stress, and posttraumatic stress. Users can correlate changes in their medication regimen or home or work environment to changes in their moods. By recording an experience at the time and place that it happens, patients can more accurately convey information about their emotional states to their health providers, thus improving the quality of treatment.

With the Internet of Things, digital heart monitors, stethoscopes, blood glucose monitors, and other diagnostic devices can be connected or accessed remotely, sending data to a health care provider. Some include virtual doctor visits that use home monitoring devices and communication tools such as Skype.

Remote data sharing can also be used in crisis communications. After the 2011 Fukushima nuclear disaster, a crowdsourced monitoring effort was launched to obtain more information about radiation levels throughout the country. Data captured from Geiger counters were fed into central information sources, which aggregated radiation readings from government, nonprofit groups, and other sources. (See Chapter 22 for more details on crowd-sourcing during emergencies.)

Those developing or using mobile applications for risk communication should consider three important issues:

- **Access.** Will all those the communicator is trying to reach have the ability to access and maintain these applications? How reliable are the service platforms, including providers of telecommunications, power, storage, security, and peripheral devices such as sensors and other diagnostic tools?
- **Maintenance.** Who will update the applications when needed? How will users know that updates are available?
- **Privacy.** Is gathering personal information, including health status and location, legal and ethical in the application used? Are users made aware of what data can be collected and shared about them? How is information security assured? Can users adjust privacy settings or maintain anonymity? A good place to find privacy checklists is GSMA, a trade organization representing mobile operators worldwide. GSMA has published universal privacy principles and design guidelines for mobile applications that collect and use personal information (GSMA 2011).

Web and Satellite Broadcasts

Telebriefings, webinars, live streaming video and audio, and satellite broadcasts are often used for communication to select or large populations. Like traditional mass media, they quickly reach many people at the same time, but often with the added benefit of being interactive, enabling discussion among participants.

Telebriefings are similar to press conferences or updates, but they use a conference call format. The advantage of telebriefings is that they can be conducted anywhere as they do not require participants to travel to a news conference location. The organizers plan the briefing in advance, often to address urgent or time-sensitive issues, and invite people to call in. Sometimes telebriefings are broadcast in streaming audio on websites, and people have the option of calling in to ask questions. For toll-free lines, participation is usually controlled in advance by using a listserv, e-mail list, or password-protected area on the Internet. Organizers can send electronic presentations or other materials in advance to participants, or put them on a website.

The CDC conducts numerous telebriefings each year on public health topics including anthrax, smallpox, West Nile virus, severe acute respiratory syndrome (SARS), hurricane recovery, and many others. The organization posts transcripts of its telebriefings on its website.

Webcasts and streaming video are audio and video programs that are converted into files for hearing and/or seeing on a website. They can be live or recorded and archived for on-demand viewing later. Live broadcasts are advertised in advance, then people log on by clicking on a website link that becomes active when the webcast occurs. Viewing requires access to a standard media player program and sufficient bandwidth connection to hear and see the program clearly. Participants can be given access to audio files, transcripts, and related reference materials.

Good examples of web-delivered audio and video abound. The CDC has an entire section of its website devoted to multimedia tools, including videos and podcasts on topics ranging from e-cigarettes to walkable communities.

Satellite broadcasts are good for reaching sites around the country simultaneously. Viewers congregate at downlink host sites that have the proper coordinates to link to the broadcast. Many satellite broadcasts are interactive. The CDC, for example, has broadcasted programs simultaneously in the United States and Canada via satellite, Dish Network, webcast, and web conference. Panels of experts answer questions posed by viewers throughout the broadcast.

For computer-delivered multimedia programs, consider the following guidelines:

- Clearly state user access instructions in introductory materials or on the Internet.
- Specify the program duration. For live programs, note the time zone.
- List the requirements to view or hear the program. It is easiest for the user to click on a link to see whether his or her system is configured properly to handle the program. Consider having various bandwidth speeds to accommodate various users.
- Provide a solution, such as a technical support person standing by or a person to ail, in case participants have problems.
- Tell people where to get more information about the topic, online and elsewhere.
- For telebriefings, clearly introduce the speakers at the beginning. Make sure that all participants (including questioners) state their names and affiliations.
- Use a password for online access if you want to limit the information to specific audiences.
- Consider making a very short questionnaire available at the end of web-based programs for user evaluation and program planning.

TRADITIONAL ELECTRONIC FORUMS

Many organizations also use more traditional electronic forums for risk-related discussions, including e-mail lists, listservs, and newsgroups.

E-mail lists and listservs enable subscribers to receive and sometimes send messages. Traditional mailing lists are often one way, with organizations sending information to subscribers. For example, the CDC invites people to set up subscription profiles so that they receive updated health-related information on items of their interest. The International Food Safety and Quality Network offers online forums on topics ranging from food labeling requirements to the safety of food processing plants. People can register for moderated, online chats hosted by the Leukemia and Lymphoma Society.

The International Society for Infectious Diseases operates ProMED, an international electronic reporting system to speed identification of major diseases of plants, animals, and humans. It provides early warning of disease outbreaks, distributed by e-mail to direct subscribers and posted immediately on the ProMED website. Expert moderators screen, review, and investigate reports before posting to the network. As of 2017, ProMED was reaching more than 70,000 subscribers in 185 countries. The system was responsible for the first-reported existence of SARS internationally and helped track its spread (Green et al. 2007).

Additional guidance on using e-mail, listservs, and discussion forums to communicate about risk includes the following:

- **Focus the topic.** More users are blocking spam or filtering out information from lists on a particular topic. So, for example, instead of hosting a list for employees related to all safety risks at your company, you might want separate lists on laboratory safety, equipment operations safety, and office safety to better meet audience needs.
- **Establish ground rules.** Clearly state the kind of discussion forum behavior you expect. Many lists have rules against posting personal information or advertisements for products or services.
- **Clearly state whether the list is moderated.** Many lists have a host who ensures that messages arrive and are sent to all list subscribers appropriately. Sometimes these hosts act as moderators, screening postings to ensure that nothing proprietary, inflammatory, redundant, or off the subject is sent to the subscribers. Especially for lists communicating risk information, let all subscribers know in advance whether a moderator will be used, what rules the moderator will use to screen information, and how to appeal if a decision inadvertently censors important information. When the moderator does reject a message, make sure that the subscriber is aware of the reason and has the opportunity to rephrase the message in more appropriate terms. If subscribers post information that does not appear, with no explanation, resentment will increase, and participation will fall off.

INTERACTIVE MULTIMEDIA PROGRAMS IN PUBLIC PLACES

User-navigated computer programs contained in kiosks are another option for risk communication. The user selects information at will and can skip around to various topics. Many use touch screens for easy user interfacing. Nevertheless, the degree of sophistication varies widely. Kiosks may range from a self-contained computer program to those that connect to the Internet or other networks. Computer kiosks can let users browse the Internet, send e-mail photos, send video, conduct business transactions, view virtual reality exhibits, and print information.

A kiosk in a public place, such as a community center, university, library, or health center, can be one component of a broader communication plan. Being unstaffed, kiosks can add efficiency and reduce labor costs by freeing employees to do other things. Through questions, computer programs can tailor information to the user's demographics, experience, literacy level, and other characteristics. Kiosks are especially useful for populations without widespread computer access.

> Kiosks are especially useful for populations without widespread computer access.

Staff from a federally funded climate change research program created an educational, interactive touch screen program that runs on a kiosk in a community center in Alaska (Figure 18.1). The kiosk uses a custom-built multimedia program running on a standard laptop computer. The program consists of

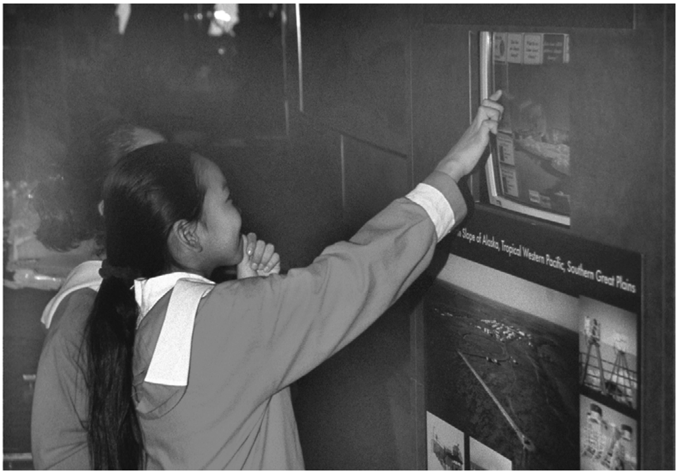

Slope of Alaska, Tropical Western Pacific, Southern Great Plains

Figure 18.1. Touch screen program in a kiosk in Barrow, Alaska. The program, which uses video clips and animation, describes climate change and research being conducted in the surrounding North Slope of Alaska. (Source: Mike Ebinger, ARM Climate Research Facility Education and Outreach.)

interviews of Alaskan community members, primarily Iriupiat tribal elders, with additional animations and material from program scientists. The program is designed to answer questions about the research program and describe how the climate has changed over time.

In the video clips, a local whaling captain speaks about how he has seen the sea ice become thinner over time, and how this makes the spring whale hunt more difficult and more dangerous for the hunters. One elder speaks about how it freezes later each year, which affects when people can put their nets through the ice. Scientists speak about what they are measuring and what causes climate change. Residents and visitors have been very excited about the program; an elaborate tribal celebration with dancing and singing was held when the kiosk was first unveiled.

Kiosks have been shown to be effective in health interventions, when risks are communicated but the underlying goal is to encourage behavior change. Researcher Armando Valdez designed a successful kiosk-based information program designed to promote breast cancer screening among low-income, low-literacy Latinas in California (Valdez 2002). Extensive formative research had revealed misconceptions and information gaps among the target audience that were directly addressed in the 10-module program. Video clips showed Latina women speaking about their experiences, getting mammograms, and giving advice about early screening. The program also directly addressed common misconceptions such as “Breast cancer is an automatic death sentence,” “Breast cancer risk decreases with age,” and “Putting off treatment gives the cancer a chance to get better.”

Using the touch screen, women were asked a few introductory questions about their spoken language, age, and personal screening history, and then given access to various customized modules, which they could choose at will. Every module emphasized the importance of taking action to get early screening. Women were also given the option of printing out information about where to get a mammogram, including clinics offering low-cost or free services.

Results showed increased knowledge and, most importantly, a very high rate of behavior change. Fifty-one percent of women got mammograms after viewing the program, as opposed to other interventions, which typically produce results ranging from 20 to 40%. The kiosk format was effective when other intervention methods—videos, public service announcements, and print media—were not working well for the target population.

In 1997, the University of Michigan’s Health Media Research Laboratory developed its “Health-O-Vision” software and placed 100 interactive, touch screen health kiosks in shopping malls, supermarkets, medical centers, libraries, community centers, and other high-traffic settings. The kiosks are designed to convey a range of topics, including smoking cessation and prevention, cancer screening, bicycle helmet safety, immunizations, cardiovascular disease prevention, alcohol problem detection, and sexually transmitted disease prevention. The kiosk is designed to look like a television, allowing users to select and interact with risk factor “channels.” Each kiosk is linked via the Internet to a central data collection system at the University of Michigan’s Health Media Research Laboratory, allowing data collection on usage and satisfaction. Public health and medical specialists, computer programmers, graphic artists, and Hollywood Screen Writers Guild writers joined forces on the project, which was funded by proceeds from the state tobacco tax. More than 400,000 people use the kiosks each year (Strecher et al. 1999).

The U.S. Environmental Protection Agency (EPA) lists challenges to consider in providing kiosks for public participation related to decision making about environment risks (EPA n.d.):

- Sophisticated information programs and rugged requirements make interactive displays expensive.
- It takes time to design, program, build, and set up kiosks.
- After construction and installation, kiosks must be maintained to keep them operational.
- Any new technology involving machines may cause unease to portions of the public.
- Strategic siting of kiosks is imperative; they should be in areas frequented by large numbers of people who are likely to be interested in spending time learning about community issues. Potential vandalism is a factor in site selection.

Follow these tips, adapted from the EPA, for successful kiosk planning:

- Understand how a kiosk fits into your overall communication strategy. For example, does it offer anything more or reach any additional stakeholders than can be achieved through your website or other outreach?
- Conduct local meetings to determine whether interactive video would be a viable option for your community. The interactive video network might be used to serve a number of community projects and needs and build the community’s capacity to participate in decision making about a variety of issues.
- When estimating the cost, include not just the hardware and software but also the network connections, implementation, maintenance, and upgrades.
- Contact communications providers and government agencies for funding and sponsorship for the project (for example, telecommunications companies may lay fiber optics as part of their community service obligations). Sponsorship is more likely if a number of agencies can present a case for using the systems.
- Understand what your audiences want and need to know, and design the information accordingly. Develop material that can be navigated like web pages.

- Test the information with the intended audience for usability. The Alaska kiosk program, for example, was developed and tested for more than a year before it was installed in 2003.
- Identify specialized software and industrial designers, as well as programmers to set up the display and troubleshoot it.
- Ensure you have a high-speed Internet connection.
- Make sure that there is a way for users or administrators to report any problems, fix technology glitches, and update information as necessary.
- Conduct regular policing to prevent vandalism.
- Build in ways to evaluate effectiveness.

TECHNOLOGY IN CARE COMMUNICATION

When risk managers, technical and public health professionals, members of the public, and other individuals need to find current information about a given risk, the Internet has become a starting point. Though the Internet is unregulated and thus subject to abuse and commercial exploitation, many credible organizations are represented online.

Many publications give guidelines and standards for properly preparing information to be viewed on the Internet; see the resource list at the end of this chapter. When designing websites to communicate, a few points should be emphasized:

- **Establish your organization's credibility.** Anyone can put risk-related advice on the Internet, and it is difficult for users to know whom they should trust, especially when they receive conflicting information. Establish your credibility in the "About" section by describing your organization, its role, and your accountability. It helps to have testimonials from others.
- **Put your risk information in context and qualify it.** When including risk information, tell how it was prepared and how accuracy is ensured. Include any qualifying statements about the limitations of risk estimates. Medical professionals, for example, caution that online cancer risk calculators often neglect to state whether the risk is from getting a disease or dying from it, how the risk compares with those of other people or other cancer risks, and the level of uncertainty inherent in the estimate (Woloshin et al. 2003). Say when the risk information was last updated. Make sure that all downloadable papers, presentations, and other information include publication dates and are traceable back to their sources.
- **Be ethical.** Specify the purpose of the site, including any commercial purposes and advertising. Identify any potential conflicts of interest or biases. Explain how the privacy and confidentiality of any personal information collected are protected.

> Make sure that all downloadable papers, presentations, and other information include publication dates and are traceable back to their sources.

- **Collaborate with credible others.** View the Internet as a way to collaborate, especially for skeptical or hostile audiences. Provide links to related regulatory agencies, environmental or civic groups, universities, and other such sites. Common Internet courtesy is to request such linking beforehand and to provide reciprocal linking if possible (you link to them, and they link to you). Check with your organization first before linking. Some government agencies and industrial organizations have policies about linking to certain other sites to avoid the appearance of endorsing them.
- **Conduct usability testing.** Content is king, so make sure that users can find the information they want and need, in language to which they can relate. Make sure that content, including graphics and downloaded files, comes up within seconds on a variety of computer platforms and bandwidth speeds. Make sure that the site's structure, navigation, and search function are clearly and logically organized to let users find what they need, know where they are, and get back to where they were.
- **Evaluate.** Look at your web user statistics to get a greater understanding of who is accessing your website, keywords they're searching for, pages that are most and least visited, and other user information. You can also use services to measure user satisfaction. CDC, for example, hired the American Customer Satisfaction Index to survey users about the CDC website's quality, value, and extent to which expectations were met. In 2016, CDC.gov received a satisfaction score of 82, ranking first in customer satisfaction for all federal portals and department main sites.

Also consider the guidelines for the visual representation of risk (Chapter 14) as well as the development of information materials (Chapter 13).

TECHNOLOGY IN CONSENSUS COMMUNICATION

Computer technology can be used effectively in risk communication that involves groups or individuals in a decision-making process. This section summarizes some of the most common tools and guidelines for each.

Websites

In consensus communication, websites can describe a risk and its options for mitigation and invite public input that can be used to craft a decision. The U.S. Department of Energy and other federal agencies, as part of public involvement on environmental analyses, often put draft publications online for review and comment. Stakeholders can use a feedback form on the website to submit comments.

In 2012, EPA launched NEPAssist (https://www.epa.gov/nepa/nepassist), a mapping tool designed to facilitate the environmental review processes and project planning under the National Environmental Policy Act (NEPA). The web-based tool shows environmental assessment indicators for locations that the user specifies, drawing environmental data dynamically from EPA's geographic information system databases and web services. For example, users can enter any location of interest in the United States and choose to see information about that area such as hazardous wastes, air emissions, water discharges, toxic releases, Superfund sites, demographic data, flood hazard zones, wetlands, and other data sources. Users can visualize features geographically, such as the outline of an aquifer on the map, in context with other features—a difficult task to find in sometimes-obscure environmental impact review documents. A special feature, EJSCREEN, is an environmental justice mapping and screening tool. Users choose a geographic area, and the tool then provides demographic and environmental information for that area. EPA uses it as a nationally consistent data set and approach for combining environmental and demographic indicators. NEPAssist was designed to streamline the review process for decision makers and stakeholders, raising important environmental issues at the earliest stages of project development.

These types of applications can be effective in consensus communication for several reasons:

- They are accessible from a variety of locations, allowing stakeholders to interact at home, work, school, or other settings.
- They break what would otherwise be insurmountable amounts of information into manageable chunks that provide insight into the larger picture.
- They offer the ability for stakeholders to manipulate the data in ways that are most meaningful for them.

To be successful in communicating risk information in a consensus process through a website, make sure that your application can meet these criteria. See Chapter 17 for additional information on working with stakeholders.

Tracking and Analyzing Comments and Responses

Many commercial software programs are available to capture and track stakeholder comments and issues and an organization's or agency's responses. These are often used to understand public sentiment in regulatory processes such as environmental impact statements or processes such as federal rulemaking to adopt or change a policy. The idea is to track who commented, when, what they said, and what the response was. Some tools use artificial intelligence and natural language processing to group comments by sentiment and count duplicate comments.

Agencies in several states have used a software tool called Smart Comment to manage their public input for projects such as changes to public infrastructure, a proposed mine, oil discovery on Alaska's North Slope, and cleanup of a rocket test and nuclear facility. The software accepts comments in various forms, including online, e-mails, letters, public hearing transcripts, handwritten comments cards, and social media comments. It enables you to plot comments on a map by topic, so you can identify specific concerns in a given area and effectively plan additional outreach.

These agencies use the software to organize comments by topic, analyze them, and display the results visually in charts and graphs. Specific roles or topics can be assigned to individual members of the project team for response.

The National Park Service developed its own Planning, Environment, and Public Comment (PEPC) system (http://parkplanning.nps.gov/) that lets users see and select from all the NEPA documents open for review and comment that pertain to U.S. national park sites. Those responsible for NEPA compliance use PEPC for project management—to structure, streamline, and track the compliance process. For each project, the public can see the plan process, meeting notices, and document lists and can comment online. It makes the NEPA process more efficient, including shortening the time needed to process and analyze public comments received through online submission. It also enables collaborative development, and online publication and storage, of NEPA documents. Many parks now are using the system as the primary method for submitting and receiving comments.

The key feature of these systems from a risk communication standpoint is transparency. Both those tracking and analyzing the comments and individual commenters can see the process, how each comment relates to the decision, and final resolutions. If you decide to use similar systems, ensure that they too are transparent to your stakeholders and that your organization has procedures in place to ensure that information is appropriately reviewed before being posted online.

For online comment-and-response forums, you should ensure that your website is accessible under the Americans with Disabilities Act. Government agencies and contractors must also comply with Section 508 of the Rehabilitation Act of 1973, which provides accessible standards for information and communication technology, including websites.

Facilitating Group Decision Making

The increase in community and technical advisory panels, as well as public and technical workshops, means that many viewpoints must be fairly considered and balanced, especially to reach consensus. This process is made more difficult when viewpoints are polarized and issues are complex.

Studies show that situations in which a group must reach consensus work best when computer-mediated communication is combined with face-to-face interaction.

Many software and hardware combinations are available to help facilitate group decision processes, sometimes called group decision support systems. These technologies help with brainstorming ideas, presenting and weighing group members' viewpoints, visualizing "what-if" scenarios of processes or systems, ranking or rating items, voting, and reaching consensus. One way to use these systems is to have all group members in a meeting room, or in diverse geographic areas but in a shared web area, where they type comments via computer terminals, and comments are redisplayed on an electronic whiteboard or on each other's screens. If the comments are anonymous, participants experience more freedom to verbalize and criticize others' ideas without the fear of reprisal (Jessup et al. 1990; Valacich et al. 1992). Though this process may cause greater conflict within the group, the conflict tends to be substantive rather than interpersonal, and decision making may be enhanced (Watson et al. 1988).

One caution from research studies is that situations in which the group must reach consensus appear to work best when combined with face-to-face interaction. More social interaction than just working individually on computers is needed to reach agreement, especially when the group is given restricted time periods (Hiltz et al. 1986; Siegel et al. 1986). One such study showed that the highest decision quality was achieved with a two-phase arrangement. Anonymous computer-mediated communication was used for brainstorming ideas, and face-to-face interaction was used for evaluation and reaching consensus (Olaniran 1994).

CH2M Hill, an environmental engineering firm, created a software application that they use to help groups reach consensus (McMakin et al. 1995). They use the software in conjunction with a nominal group technique, a structured method for discussing and evaluating issues. The process involves developing criteria that capture the salient points of the issues, assigning weights to the criteria (each participant does this), conducting a statistical analysis of the weights, and discussing the results as group. This process can be repeated several times, in which the group members often move closer together in their views as they carve out common ground. This process requires not only mastery of the software that documents the statistical analysis but also excellent facilitation skills to capture and clarify viewpoints while keeping the process moving.

A national program to clean up the U.S. Department of Energy's former sites used computer-mediated communication in its public participation process to rank criteria, vote, and conduct other group activities. The software they used displayed visual results, such as bar charts. Group members used remote touch pads for recording input and voting. Agency representatives report that the software has saved hours of discussion time that would ordinarily be required by traditional methods (McMakin et al. 1995).

Professional facilitator and dispute resolution expert Jim Creighton offers some recommendations for using technology in group decision making (Creighton and Adams 2002):

> Focus the process on the user and the purpose, not the technology.
> —Jim Creighton (Creighton and Adams 2002, p. 180).

- **Put the collaboration first, rather than the technology.** Technology does not magically transform diverse people, especially adversaries, into collaborative partners. A group decision process must be expertly designed to involve all participants, resolve disputes, and achieve the goals of the collaboration.
- **Match the technology to the process.** Information briefings from a trusted source may require only e-mail or Intranet communication, whereas conflict resolution may require more elaborate technologies that demonstrate that all points of view have been heard and recorded.
- **Count the costs and benefits.** Costs can include software and equipment, technicians to set up and troubleshoot it, transaction charges for telecommunications, and leader and/or facilitator labor. But remember to balance that with likely cost reductions: less travel by participants, less time spent in meetings, and a more efficient decision-making process.

TECHNOLOGY IN CRISIS COMMUNICATION

Most of the same technology tools used in care and consensus communication can also be used in crisis communication. This section describes some of the basic principles for using these methods during crises. Chapter 22 of this book includes more information about technology-assisted communication in emergencies. Chapter 19, Social Media, describes the use of interactive technologies in crisis communications.

Mobile Devices

Mobile devices are an important way to communicate risk information in crisis situations. Free emergency preparedness apps can help people during a crisis, even when they don't have cell service. For example, the Red Cross offers numerous apps, including those for a shelter finder, first aid, hurricane, earthquake, wildfire, and others. Each one includes checklists, advice during emergency situations (from performing first aid and CPR to handling food and water during power outages), quizzes, signing up for emergency notifications, and more.

The Association of Public-Safety Communications Officials (APCO) provides a collection of apps related to public safety and emergency response, for use by the public and first responders (http://appcomm.org/). Apps include those for 911 and alerts, as well as those for police, fire, and emergency medical services. Users can rate the apps and suggest others. APCO also partners with developers to test new apps.

An app called MyShake crowdsources ground-shaking information from the aerometers in smart phones to detect quakes. On any given day, thousands of phones provide data to the system; the network has recorded earthquakes around the world.

Beginning in 2012, government agencies partnered with wireless carriers to send geographically targeted text alerts to the members of the public who registered for alerts. Subscribers get presidential messages, AMBER alerts, and imminent threat alerts to mobile phones using a broadcast technology that will not get backlogged during emergencies when wireless voice and data services can become congested.

Case Study: Wireless Alerts Found Effective, but Improvements Needed

In September 2016, five bombs exploded in New York and New Jersey, with more found unexploded. Thirty-one people were injured in the blasts. The New York police department was urgently seeking information about a suspect in New York's Chelsea neighborhood whom police feared could plan more bombings. The city's Office of Emergency Management took the rare step of using the federal wireless emergency alert system to deliver the following message to millions of New Yorkers on their cell phones: "WANTED: Ahmad Khan Rahami, 28-year-old male. See media for pic. Call 9-1-1 if seen."

About 3 hours after the alert went out, Rahami was captured in New Jersey after a shootout with police. New York officials said the quick capture was due in part to the alert. "From what we know right now, it definitely contributed to the successful apprehension of this suspect," New York Mayor Bill de Blasio said in a press conference (Ryall 2016).

This was not the first time New York had used the wireless alert system. City officials also used such alerts to send evacuation and shelter-in-place orders to its residents during Hurricane Sandy in 2012 and travel bans during blizzards in 2015 and 2016. The text alert method reaches people instantly, and they go to anyone in New York's five boroughs—meaning visitors get the message and New Yorkers who are out of town don't.

Despite the reach and immediacy of the wireless emergency alert system, public safety practitioners and other stakeholders called for improvements after the New York and New Jersey bombings. For example, the manhunt alert was criticized for its limited functionality, such as not being able to include a photo of the suspect or link to additional information.

In 2018, the Federal Communication Commission voted to require U.S. wireless companies to deliver emergency alerts more accurately, beginning in 2019. Alerts would be sent only to geographic regions that are in harm's way, expand the character limit from 90 to 360, and support Spanish language. One goal: make alerts more targeted and useful.

This example illustrates how technology adds communication benefits, but can always be improved. When determining which technology tools to use as part of an overall communication plan, risk communication practitioners must understand and weigh the advantages and disadvantages of each tool.

At the time of this writing, several municipalities and services also offer the ability for residents in specific geographic areas to receive emergency notifications via phone, text, and/or e-mails. Citizens register to be notified. One such service is Reverse 911®. Cities have used such services to send alerts for flood and wildfire evacuations, missing toddlers and Alzheimer's patients, boil water notifications, hazardous material releases, and escaped prisoners.

Officials in Washington, DC, used text alerts as part of a strategy to protect hundreds of thousands of visitors from potential threats on the weekend of January 20, 2017, for the inauguration of President Donald Trump and the Women's March. Visitors could easily opt in to these public alerts by texting the keyword "INAUG" to 888-777, thereby initiating alerts regarding weather, traffic, and public safety. Officials noted that the text subscription method was effective because visitors want all alerts for a specific event and want to stop receiving alerts after it is over. They are not interested in spending time to visit a website, create a username and password, enter their contact information, or choose from numerous subscription options (Crane 2017). Officials promoted the text feature with signage and handouts in the areas around the event as well as in social media.

People often access social media on mobile devices during crises. Google, Facebook, and Twitter all have crisis response features to provide information, including alerts, finding people, notifying others that you're safe, and maps of crisis locations. People send text messages and e-mails and post notifications about their whereabouts and immediate needs, or look up evacuation information and shelter locations.

Many state and local government agencies have set up their own social networking sites for crisis communications. For example, InciWeb, available through Twitter and online, reports current information on U.S. wildland fires. The U.S. Forest Service, with other agencies, developed this online information and alerting system. Users can sort incidents by name of the fire or state and see percent containment, acres affected, photos, and news articles about each fire. They can also register to receive RSS feeds on specific fires.

Ironically, as much as we rely on technology in emergencies, it can be the first thing to fail. In recent years, various crises worldwide have crashed websites, overloaded phone lines, rendered cell phone towers inoperable, and triggered regional electrical blackouts. Organizations responsible for communicating risks should have backup communication plans that account for failure of standard public communication methods. The Oregon chemical weapons depot, for example, distributed battery-powered tone alert radios to citizens in surrounding communities. Some experts recommend using a portable battery charger for phones, and keeping it charged, or using a portable battery booster that uses a hand-crank.

To help residents and emergency personnel stay connected during Hurricane Irma in 2017, Comcast temporarily opened its more than 137,000 Xfinity WiFi hotspots throughout Florida to anyone who needed them, for free. In situations where there is Wi-Fi, but no cellular service, people can make video and audio calls using apps such as Facebook Messenger or Skype. Some tools may require setup ahead of time.

Emergency Planning and Training Tools

Emergency planning and exercises have their own technology tools, such as software programs, that are useful for planning and implementing crisis communications. One example, used by the Federal Emergency Management Agency and its partners, is the Standard Unified Modeling, Mapping, and Integration Toolkit, known as SUMMIT. SUMMIT is a modeling and simulation software environment that enables analysts, emergency planners, responders, and decision makers to access integrated suites of modeling tools and data sources for planning, exercise, or operational response. SUMMIT has a library of scenarios for a number of threats to support scenario development and exercise evaluation. For example, SUMMIT has a scenario that links contaminant plume modeling to medical effects, infrastructure effects, medical needs, and hospital bed shortfall models. Any changes in the plume release will automatically and realistically be reflected in the other parts of the model. Users can visualize building damage and other conditions that occur after a disaster. They can analyze the "what if" tradeoffs that are important in effective response. Since 2010, SUMMIT has been used in small- and large-scale exercises to accelerate scenario planning, provide scientifically grounded scenario data, and enhance the realism and common operating picture.

Virtual reality websites, which are immersive synthetic environments, are also useful for crisis communication planning. They enable you to create a persona, in the form of a physical avatar, and interact with others and three-dimensional objects online in virtual worlds. Virtual worlds often also offer resources such as blogs, wikis, instant messaging, and sharing user-created objects to connect with others on topics of interest. Research has shown advantages for the use of virtual worlds for educational and training purposes. By allowing learners to interact with other avatars in a safe, simulated environment, it is possible to decrease student anxiety, increase competency in learning a new skill, and encourage cooperation, collaboration, and conflict resolution (Hansen 2008).

The most established virtual world as of the time of this writing, Second Life, is a three-dimensional environment that is "inhabited" by millions of people worldwide. Emergency responders have used Second Life and a commercial software development toolkit known as OLIVE to simulate real-life disaster and emergency incidents (Figures 18.2 and 18.3). The training exercises have included government sectors and specialty fields such as medical and transportation to create small- and large-scale responses from multiple agencies. Users practice elements of crisis communication, incident command, and resource management. Simulation-based training with avatars can fill gaps in traditional training techniques for first responders. Trainers can replicate emergencies in the locations where they are likely to occur without disturbing the public (Figure 18.4). Once

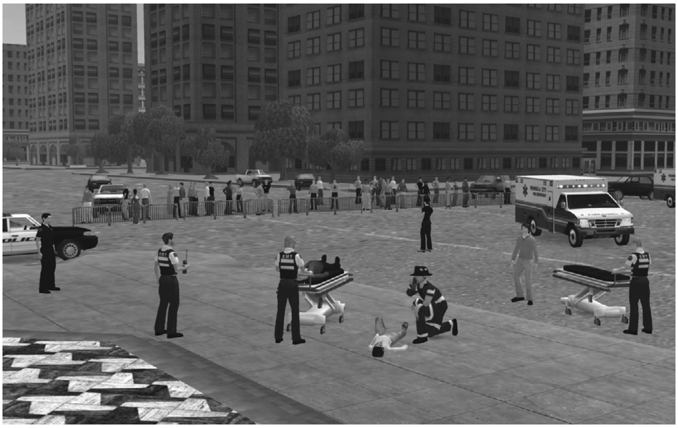


Figure 18.2. Mass casualty response scene in OLIVE, software for creating virtual worlds. Sixty avatars were logged into this simulation, which was used for emergency response training. (Source: SAIC, used with permission. The emergency preparedness and medical features of the OLIVE technology were developed by Forterra Systems with funding from the U.S. Army Telemedicine and Advanced Technology Research Center.)

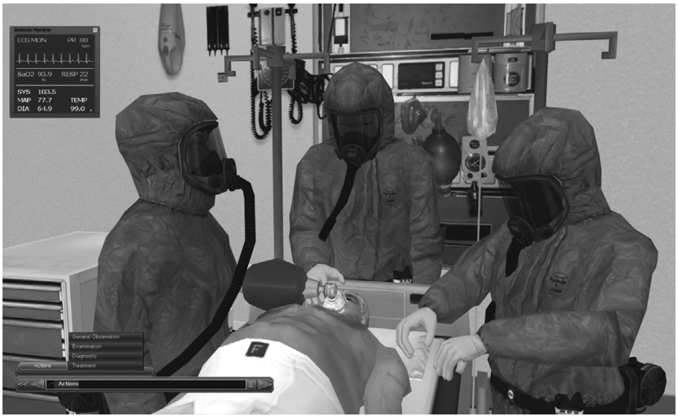

Bedside Monitor
ECG MON
PR 88 bpm
SaO2 93.9 %
RESP 22 /min
SYS 103.5
MAP 77.7
DIA 64.9
TEMP 99.0 F
General Observation
Examination
Diagnostic
Treatment
Actions
<<
Actions

Figure 18.3. Virtual reality emergency room exercise. A physician and two nurses “treat” a virtual patient who has been exposed to sarin nerve agent. The physician and nurse avatars are controlled by an actual emergency department physician and nurses who are going through a chemical hazard response scenario; the victim is played by a role player. The victim’s vital signs are generated by a physiology computer model and displayed in the “bedside monitor” display in the upper left-hand corner of the screen. (Source: SAIC, used with permission.)

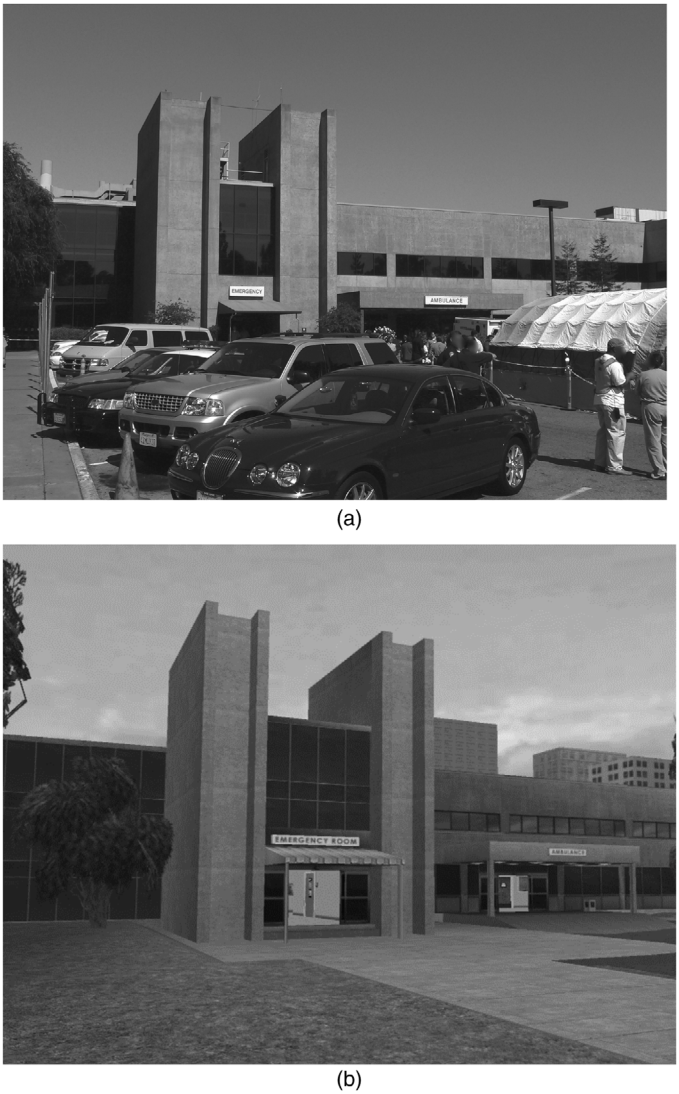


Figure 18.4. Stanford Medical Center, real (a) and virtual (b), for emergency response training. (Source: SAIC, used with permission.)

built, these scenarios can be practiced numerous times over the Internet with participants in various locations.

The SciLands Virtual Continent, a Second Life section devoted exclusively to science and technology, includes government agencies, universities, and museums. They have regular meetings in Second Life where they share ideas, help each other, and plan future projects. The Information Resources Management College at the National Defense University in Washington, DC has a Second Life island that includes a virtual replica of the college's Crisis Management Center at Fort McNair in Washington.

The National Institutes of Health Tox Town on Second Life highlights "chemical environmental health concerns and toxic chemicals where you live, work, and play." The National Oceanic and Atmospheric Administration's Earth System Research Lab enables people to experience some of the scientific research center's earth and weather simulators, including an interactive weather map.

As virtual worlds grow in size and prominence, real-world governments and other organizations are increasingly using them to pursue their missions such as educating the public or enforcing federal laws. The Emergency Management Nexus, for example, was one of the first massive multiplayer virtual environments specifically designed for use by government personnel. Emergency Management Nexus supports workplace education training and collaboration through the use of virtual classrooms, training facilities, and collaborative workspaces. It aims to enhance worker productivity and reduce costs.

The U.S. Department of Energy adopted a 3D virtual reality simulation in 2012 to help train power plant control room and field operators. Wearing a stereoscopic headset, field operators are immersed in a virtual environment with the ability to move throughout the plant, coordinating their activities with control room operators and interacting as if they were in the actual facility. The simulation combines 360° views with collision effects, sounds, lighting, and weather conditions to give the plant operator a realistic environment. Interactive animations respond and react to the actions of plant personnel, illustrating how various pieces of equipment will operate under almost any scenario and condition. The simulation helps field and control room operators learn to collaborate and perform as a team (Invensys Operations Management 2012).

The Federal Consortium for Virtual Worlds is a group of federal government employees and contractors that are exploring the use of virtual worlds in government. They set standards, share best practices and policies, create shared repositories, and network. They often hold their meetings simultaneously in real and virtual locations.

When choosing to create or participate in a virtual world, consider the costs and benefits, and whether your target audience or stakeholders all have access. Also consider the broadband requirements and the needs for security and firewalls.

CHECKLIST FOR TECHNOLOGY-ASSISTED COMMUNICATION

☐ The particular type of technology is determined to be appropriate and useful to meet the communication objectives.

☐ Tools are designed to use the special characteristics of the medium, not just as a substitute for other forms of communication.

☐ Computer-based information is prioritized and organized so users can easily find what they need.

☐ When possible, technology applications are pretested with the intended audiences before implementation.

☐ The participants have access to the equipment and software needed to use the tools.

☐ The participants are willing to use the tools and know how to use them effectively, or training and/or facilitation are provided.

☐ Proprietary or sensitive information is not used on networked computer systems.

☐ Information provided on the Internet is updated as appropriate to maintain its usefulness.

☐ In public participation situations, technology tools include feedback systems to support a two-way communication process.

☐ In crisis communication, a backup plan for communication is in place in case of electricity loss or other disaster.

REFERENCES

CareAppointment. 2017. "Webwatch: Leicester Researchers Develop Cancer Survival Prediction Tool." http://www.careappointments.co.uk/features/webwatch/item/42153-webwatch-leicester-researchers-develop-cancer-survival-prediction-tool (accessed October 1, 2017).

Crane, T. 2017. "Lessons on Emergency Preparedness from the Presidential Inauguration." GCN, February 21. https://gcn.com/articles/2017/02/21/emergency-preparedness-alerts.aspx (accessed September 17, 2017).

Creighton, J.L. and J.W.R. Adams. 2002. *Cyber Meeting: How to Link People and Technology in Your Organization*. Xlibris Corporation, Philadelphia, Pennsylvania.

EPA (U.S. Environmental Protection Agency). n.d. Public Participation Guide. https://www.epa.gov/international-cooperation/public-participation-guide (accessed September 14, 2017)

Freng, I.A., S. Sherrington, D. Dicks, N. Gray, and S. Chang. 2011. "Mobile Communications for Medical Care: A Study of Current and Future Healthcare and Health Promotion Applications, and Their Use in China and Elsewhere." University of Cambridge and China Mobile.

Green, M., J. Zenilman, D. Cohen, I. Wiser, and R. Balicer. 2007. *Risk Assessment and Risk Communication Strategies in Bioterrorism Preparedness*, NATO Security through Science Series-A: Chemistry and Biology. Springer, Dordrecht, The Netherlands.

GSMA. 2011. "Mobile Privacy Principles: Providing Consumer Privacy in the Mobile Ecosystem." GSMA, London, UK. https://www.gsma.com/publicpolicy/wp-content/uploads/2016/02/GSMA2016_Guidelines_Mobile_Privacy_Principles.pdf (accessed September 10, 2017)

Hansen, M.M. 2008. "Versatile, Immersive, Creative, and Dynamic Virtual 3-D Healthcare Learning Environments: A Review of the Literature." *Journal of Medical Internet Research*, 3 (10): e26. http://www.jmir.org/2008/3/e26 (accessed January 21, 2013).

Hawley S.T., L.C. An, Y. Li, et al. 2017. "Primary Outcomes Analysis of a Multicenter Randomized Controlled Trial of an Interactive Decision Tool for Patients with Breast Cancer." *Oral presentation at 2017 American Society of Clinical Oncology Annual Meeting; June 2–6, 2017, Chicago, IL.*

Hiltz, S.R., K. Johnson, and M. Turoff. 1986. "Experiments in Group Decision Making: Communication Process and Outcome in Face-to-Face Versus Computerized Conferences." *Human Communication Research*, 13: 225–252.

Invensys Operations Management. 2012. "U.S. Department of Energy Deploys Virtual Reality Training Solution from Invensys Operations Management." Power Online, October 16. https://www.poweronline.com/doc/u-s-virtual-reality-training-invensys-operations-management-0001 (accessed September 10, 2017).

Jessup, L.M., T. Connolly, and J. Galegher. 1990. "The Effects of Anonymity on Group Decision Support System Group Process with an Idea-Generating Task." *MIS Quarterly*, 14: 312–321.

Landro, L. 2011. "Don't Come Back, Hospitals Say." *The Wall Street Journal*, June 7.

McCulloch, D. 2017. "Leaping the Chasm: A Year Inside GE's Digital Transformation." March 25. https://www.linkedin.com/pulse/leaping-chasm-year-inside-ges-digital-transformation-david-mcculloch/ (accessed October 3, 2017).

McMakin, A.H., D.L. Henrich, C.A. Kuhlman, and G.W. White. 1995. *Innovative Techniques and Tools for Public Participation in U.S. Department of Energy Programs*, PNL-10664. Prepared for the U.S. Department of Energy, Pacific Northwest National Laboratory, Richland, Washington.

Olaniran, B.A. 1994. "Group Performance in Computer-Mediated and Face-to-Face Communication Media." *Management Communication Quarterly*, 7: 256–282.

Ryall, J. 2016. "Emergency Alert Sent to All New York Phones After Chelsea Bombing." Mashable, September 19. http://mashable.com/2016/09/19/bombing-chelsea-alert/#oMDVf3lS5Oq9 (accessed September 17, 2017).

Siegel, J., V. Dubrovsky, S. Kiesler, and T.W. McGuire. 1986. "Group Processes in Computer-Mediated Communication." *Organizational Behavior and Human Decision Processes*, 37: 157–187.

Strecher, V.J., T. Greenwood, C. Wang, and D. Dumont. 1999. "Interactive Multimedia and Risk Communication." *Journal of the National Cancer Institute Monographs*, 25: 134–139.

Valacich, J.S., A.R. Dennis, and J.F. Nonsmoker. 1992. "Group Size and Anonymity Effects on Computer-Mediated Idea Generation." *Small Group Research*, 23: 49–73.

Valdez, A. 2002. "Innovative Multimedia Cancer Education Interventions for Latinas." *Presented at the 130th Meeting of the American Public Health Association, November 9–13, 2002, Philadelphia, Pennsylvania.*

Watson, R.T., G. Decants, and M.S. Poole. 1988. "Using Group Decision Support Systems to Facilitate Group Consensus: Some Intended and Unintended Consequences." *MIS Quarterly*, 12: 463–478.

Woloshin, S., L.M. Schwartz, and A. Ellner. 2003. “Making Sense of Risk Information on the Web.” *BMJ*, 327: 695–696.

ADDITIONAL RESOURCES

Association for Talent Development. https://www.td.org/ (accessed September 16, 2017).

Davis, T.S. 1995. “Communicating Environmental, Health, and Safety Information to Internal and External Audiences.” *Journal of the Society for Technical Communication*, 42 (3): 460–466.

Distance Education Accrediting Commission. http://www.deac.org/ (accessed September 16, 2017).

GSMA. 2017. *Mobile Policy Handbook: An Insider’s Guide to the Issues*. GSMA, London, UK. www.gsma.com/publicpolicy/handbook (accessed September 10, 2017).

U.S. Distance Learning Association. http://www.usdla.org (accessed September 16, 2017).

Usability.gov. National Cancer Institute’s website of resources for “usable, useful and accessible websites and user interfaces.” http://www.usability.gov/ (accessed September 16, 2017).

19

SOCIAL MEDIA

Social media platforms enable organizations and individuals to connect to each other and to share information, videos, photos, and comments. Many people also get their news, including news about risks, from social media sources. As of 2017, 67% of U.S. adults got news on social media, and 20% did so often (Shearer and Gottfried 2017).

Social media can be a valuable component of risk communication. Not only does it add more distribution channels, but it also gives organizations almost instant and continuous feedback on what people want to know about risks and what they are concerned about. It also enables organizations to respond quickly as situations change. More than that, it allows organizations to become part of a community, which may increase the organization's credibility and trust with those it serves. Used properly, social media can supplement or replace more expensive and nondynamic solutions, such as conference calls, overbooked conference/ meeting rooms, and print media.

Social media has been used in crisis, care, and consensus communication. The advantages and disadvantages of using social media are discussed in Chapter 10.

Risk Communication: A Handbook for Communicating Environmental, Safety, and Health Risks,
Sixth Edition. Regina E. Lundgren and Andrea H. McMakin.
© 2018 The Institute of Electrical and Electronics Engineers, Inc., and Regina E. Lundgren
and Andrea H. McMakin. Published 2018 by John Wiley & Sons, Inc.

Chapter 18 discusses other uses of technology-assisted communication, such as websites, virtual reality settings, online forums, and multimedia programs. At the time this edition was published, social media included social networking sites; blogs and podcasts; tweeting; video-, image-, and file-sharing sites; and mapping. However, the social media landscape is constantly changing, and new applications are only a thought away.

Because of the adaptability of social media, this chapter focuses on the general principles associated with the methods before delving into the three main uses of social media for risk communication: sharing content, engaging with stakeholders, and monitoring changes in perceptions, as well as laying out some guidelines for specific types of social media. The chapter ends with techniques for evaluating the effectiveness of social media efforts, as well as how to identify and respond to fake news in social media.

GENERAL PRINCIPLES ON PARTICIPATING IN SOCIAL MEDIA TO COMMUNICATE RISK

Social media allows the two-way communication that is necessary for successful risk communication. However, use of the methods requires a shift in thinking from more traditional ways of communicating risk. For one thing, the audience is more in charge of risk communication in social media settings. As public health communication expert Craig Lefebvre puts it, in the networked world, practitioners create messages that reach audiences, but audience members also talk to practitioners, and, just as importantly, with each other (Lefebvre 2007). Social media gives the audience unprecedented control—in what they read, in how they respond, and in whether they choose to act. Lefebvre recommends that practitioners engage this world through collaboration, sharing, and interactivity.

Another way social media differs from more traditional methods of communicating risk is the sense of community. At the time of this writing, around 7 in 10 Americans use social media to connect with one another, as well as to engage with news content, share information, and entertain themselves (Pew Research Center 2018). Organizations are tapping into this sense of community to help communicate risks. For example, the U.S. Army advocates official use of social media, even in combat zones, to inform the public, keep families connected, and address inaccurate reports elsewhere. It uses Facebook to share information with Family Readiness Groups, providing a one-stop interactive source of reliable information (Office of the Chief of Public Affairs 2011).

Part of that sense of community involves the audience sharing knowledge and recommendations with each other. Some health care professionals, risk managers, and emergency response agency staff lament the effects of "crowdsourcing," where people who would have once turned to experts in private sector industries or government agencies for answers now turn to their online connections for information about personal health issues, environmental stewardship, and emergency situations. Crowdsourcing, however, has the potential for staff augmentation, creating ambassadors armed with information who can spread the word much faster and with greater credibility than an understaffed agency.

As one agency official put it, social media can also be about empowering the unaffected to help reach the affected (Tinker 2009). Using social media for risk communication can provide other benefits as well, such as increased confidence in the organization, greater understanding of audience needs, and faster response during emergencies.

In addition, social media can serve as a valuable alternative for crisis communications, when phone lines or other infrastructure may be damaged or overloaded. For example, when Hurricane Harvey hit southeast Texas in 2017, hundreds of people used social media to ask for help during massive flooding, even using their full names and addresses. Houston police used Twitter to ask anybody who could volunteer with a boat to call (Seetharaman and Wells 2017). A Reddit-hosted Hurricane Harvey Live Megathread provided a continuous feed of official reports from sources like the Federal Aviation Administration, the National Weather Service, and local energy companies, as well as individual reports from citizens providing photographs of the damage and rescues.

Because of these and other factors, risk communicators need to consider the characteristics of the audiences they hope to reach and barriers within their own organizations before using social media as a method to further care, consensus, or crisis risk communication.

Determining Audiences for Social Media

While understanding the needs of the audience is important for any type of risk communication, social media poses a unique situation, because the audience participates in content development and message transmission. Risk communicators need to consider the following:

- **Can the intended audience access social media?** As of December 2017, worldwide Internet usage averaged around 54%, with 95% of North Americans having access but only 35% of populations in Africa. Asian countries topped the list by number of users, with more than 2 billion (Internet World Stats 2017).
- **How does the intended audience use social media?** Studies show that people online fall into four categories: those who create content, those who comment on others’ content, those who collect information, and those who like to join groups for interaction (Li and Bernoff 2008). If your primary audience spends considerable time online as commenters or information collectors, blogs and podcasts might be a wise choice for at least one type of social media engagement. If they tend to be joiners, then having a presence on social networking sites such as Facebook might be a

> good choice. Another way to determine where to engage is to discover where the risk you are interested in is being discussed online. For example, Google alerts allow you to track key phrases as they appear across the Internet. Are most of the links to social networking sites, blogs, video- or file-sharing sites, or some combination?

For additional information on how various segments of the American population use social media, see the Pew Research Center's Internet and American Life Project (http://pewinternet.org/). Chapter 8 of this book provides additional information on understanding your audience.

Organizational Barriers to Social Media Adoption

Chapter 4 discusses constraints to risk communication, including those constraints imposed by an organization. Because of the perceived lack of control over risk information in social media, many organizations hesitate before sharing risk information. A survey of crisis and emergency management organizations found that the main barriers to not using social media were lack of knowledge, time, and role models for implementation, as well as inflexible and old-fashioned organizational cultures (Haataja et al. 2016). Our work with organizations considering using social media to communicate risks found additional barriers, such as concern about tarnishing the organization's image, the potential to perpetuate misinformation, information security, and inability to sustain the investment.

Lack of Knowledge, Time, or Role Models

It is a rare organization that never faces staffing constraints. Chapter 4 includes a section on how to overcome such constraints in general. For social media, partnering with volunteers or other organizations can be the key, particularly for crisis communications, where such partners may not be as overwhelmed in an emergency. For example, for care communication, CaringBridge, a popular web service that informs family and friends about people going through a serious illness and recovery, partners with a variety of organizations, including health care providers, faith-based communities, insurance providers, and employee-assistance programs. Partner organizations receive training and information on how to share CaringBridge with those they serve.

Another way to increase staff time or ability is to harness a wider swath of the organization. A panel of public relations specialists who had delved into social media for their government and private sector organizations for care and crisis communications suggested that workers need three sets of skills to effectively engage in social media: information-gathering skills, information-packaging skills, and conversational skills. Finding this skill set may take you outside the traditional public relations or communications functions in your organization

(Lesperance et al. 2010) and expand the number of staff who can support the effort.

A misunderstanding of social media also can get in the way of using it to its full potential. If social media is viewed as only another distribution channel, efforts will fail. Risk communication in social media is about audience members searching for content of most interest to them, creating additional content, and sharing it with other like-minded individuals. It is not so much about the organization pushing out information and hoping someone learns from it, but the audience members shaping information to suit their needs. This dynamic interaction may take additional thought when planning risk communication.

Culture of the Organization

Organizations that maintain strict control of their risk information may find using social media daunting. Your social media presence will not be as current or candid, for example, if your organization insists on reviewing and "scrubbing" every post before it goes out. Be clear about the purpose and objectives of your social media strategy. What problems will it fix? What opportunities will it unlock? How will any associated risks to the organization be mitigated? Where possible, integrate any new social media solutions with existing technology and business processes. Social media activities should be part of the organization's overall risk communication plan, with similar safeguards of information and a focus on audience needs. Additional information on overcoming organizational culture can be found in Chapter 4.

Concern About Tarnishing the Organization's Image

The free flow of information on social media and the possible use of nonpublic relations staff or even volunteers to manage it cause some managers to wonder whether the organization's image will be tarnished by using social media to communicate risk. One way to lessen this concern is to develop guidelines or policies for social media participation. Guidelines cover when the organization's name can be mentioned and in what context; how to gain permission to post certain types of organization-related content; reminders about confidentiality, intellectual property rights, and privacy issues; and when to forward information to the organization's legal, public relations, or communications departments. In addition, posted guidelines for public interaction (no defamatory comments, no profanity, etc.) can be shared with the audience participants. Note, however, that some organizations involved in care communication situations, such as drug development and medical equipment research, may have additional sensitivities in using social media. Contact your organization's legal counsel to ensure that you are following appropriate regulations and restrictions.

Case Study: Company Leaders Learn to Apologize

How should company leaders respond when a fiasco shared through social media damages the firm's reputation?

United Airlines came under fire after a screaming passenger was dragged off an overbooked plane on April 9, 2017, seriously injuring him in the process. The incident, captured on video, went viral on social media. United CEO Oscar Munoz demonstrated poor crisis communication with his initial statement to employees, defending the crew's actions and calling the passenger "belligerent."

That statement generated outrage on social media with memes like "If we cannot beat our competitors, we beat our customers" and "United Airlines introduces new cabin class: Fight Club." Customers threatened a boycott, and lawmakers called for an investigation. At one point, the company's stock price dropped nearly 3%, reducing the company's market value by nearly $1 billion (Bacardi 2017).

Perhaps reconsidering his approach after the backlash, Munoz tweeted a public apology the next day. He acknowledged the outrage, anger, and disappointment felt by all. "I deeply apologize to the customer forcibly removed and to all the customers aboard," he said. "No one should ever be mistreated this way." He pledged "full responsibility" and "we will work to make it right." He committed to "fix what was broken so this never happens again." He went on to describe the kinds of reviews and policy examinations that would take place and promised to communicate the results by April 30. Later that month, the company announced 10 policy changes designed to prevent such incidences in the future.

In the second statement, Munoz improved his risk communication in several ways. First, he acknowledged the emotions people felt rather than dismissing them. He personally apologized without blaming anyone. He promised to correct the situation and committed to a timeline to do so, then followed through.

Though customer perception scores dipped after the crisis, sales revenue and satisfaction began rebounding a few months later.

Potential to Perpetuate Misinformation

A concern about crowdsourcing and audience interaction is the potential for misinformation and rumor to spread. For example, in reviewing response to the damage of the Fukushima Nuclear Facility following the earthquake and tsunami off the shores of Japan in 2011, the Center for Biosecurity found that social media did perpetuate misinformation, but that even the news networks were following the online conversation and using it as a source for stories (Center for Biosecurity 2012).

One of the best ways to prevent misinformation from spreading is to be the one to share the correct information and act quickly to respond when misinformation begins circulating. The only way to do that is to engage in social media. Be first, be accurate, and be the expert on your risk, even in emergencies.

Information Security

Many organizations worry that in the highly interactive environment of social media, participants could deliberatively or inadvertently reveal information that should be kept secure or proprietary. This could include, for example, trade secrets, personal information about customers, or emergency response details that could hinder a criminal investigation.

Organizations also worry about sabotage and data leaks, where adversaries could use social media channels to introduce malicious software or get "back-door" access to company data.

These are valid concerns, and organizations need to determine how much risk they are willing to incur. A few organizations have decided not to engage in social media at all, though they may have a website. Others screen blog comments before posting them, explaining in their policy that the blog is moderated. Some turn off the comment feature on their YouTube videos or monitor and delete inappropriate comments on their Facebook pages. Some organizations block employee access to certain social media sites.

The bottom line is that organizations must develop strategies to balance the risks against the benefits of social media. This should include clearly communicating usage policies to their own staff.

Inability to Sustain the Investment

Unlike other forms of risk communication, social media requires a sustained investment. Where a report is generally issued once and a television program is produced once, social media requires continuous interaction, often several times a day. In addition, the engaged audience craves instant information, especially where health and safety are concerned.

One way to help alleviate this concern is to develop social media policies and plans for the organization. Knowing your audience, selecting the best social media tools to reach that audience, and keeping engaged can be better than casting a wider net that is more difficult to maintain. Research at the North Atlantic Treaty Organization (NATO) Defense College laid out three phases for using social media:

1. Gather resources, including the support of management, the cooperation of all staff involved, and hiring of the right talent.
2. Develop by optimizing existing communication mechanisms, finding ways to attract attention from the appropriate audience, and optimizing content for the audience.
3. Manage and maintain by constantly updating content and actively engaging in the conversation (Leiderman 2012).

Be wary, however, of immediately adopting every new tool. Research the tool thoroughly to ensure that it meets the audience and your organization's needs. For example, the user agreements for some tools include language that would give the tool developer unacceptable access and even ownership of content developed by your organization. Read all agreements closely to ensure that the effort will further your goals and not run afoul of organizational requirements.

SHARING CONTENT VIA SOCIAL MEDIA

Sharing content is the closest social media practice to more traditional forms of risk communication, but even here, engagement is the key. This is true for care, consensus, and crisis communications.

Best practices include the following:

- Think carefully about the kinds of information you want to share and use photos and video to your advantage to get your points across. Beware of too much text and jargon. Look at branding your platforms to match your organization's other communication mechanisms. Be sure to coordinate messages across all communication mechanisms.
- Share information that your audience cares about. This information may include more personal stories from those who faced similar risks, specific actions audience members can take to lower their risks, or ways to prevent risks to loved ones.
- Social networking sites thrive on community, which means interaction. Give people something to do at your site: take a quiz, play a game, watch a video, share personal stories on risks they have faced, or chat with a risk expert.
- On some sites, it is something of a coup online to have hundreds of people you allow to connect to your site. Other people can also find your site through their friends who are linked to you. However, not everyone who requests to be included on your list of friends will have the same philosophy about the risk you are communicating. Determine how you will decide to accept connections and share the approach with all involved in the effort.
- Most social networking sites allow other people to leave comments, which are visible to all visitors. Sometimes the comment section is the most interesting part of a page, and the most controversial. You may wish to state a comment-posting policy and to delete comments that don't comply. Some organizations turn off the comment feature but provide a point of contact for more information.
- Make it easy for people to pass along the content you provide. "Buttons" provide the option to share information instantly on a variety of social

media sites. You can also provide code to allow audience members to paste your information into their sites verbatim, increasing the exposure to your message.

ENGAGING WITH STAKEHOLDERS

Social media makes it easier to engage with stakeholders surrounding a risk than ever before. Where attendance at public meetings has grown sparse in some cases, stakeholders often have less trouble posting comments online, from home and at times more convenient to them. Indeed, research at the NATO Defense College found that the use of social media can increase transparency and public involvement. The research singled out social networking sites like Facebook because the content is controlled by the user and it is available worldwide (Leiderman 2012).

> As social media becomes more a part of our daily lives, people are turning to it during emergencies as well. We need to utilize these tools, to the best of our abilities, to engage and inform the public, because no matter how much federal, state, and local officials do, we will only be successful if the public is brought in as part of the team.
>
> —Craig Fugate, Federal Emergency Management Agency, press release, August 2010

Engagement can take several forms:

- **Responding to comments on your own content.** Ideally, each comment would receive some sort of response, even if it is merely "thank you for posting." On contentious issues where comments may number in the hundreds, responding to key topics or issues may be necessary for the time available. Information can be clarified; additional sources of information can be provided. Misinformation can be countered respectfully with correct information from credible experts.
- **Asking for the public to provide feedback on particular issues.** Be prepared for a diverse set of opinions. Make sure that people understand how their input will be used. Occasionally, a comment will appear completely off topic, use offensive language, or be highly critical of the organization or message. What will sometimes happen is that the community will self-regulate—that is, outlying comments will result in responses from within the audience in support of the organization or approach.
- **Allowing the audience to post content associated with a particular risk.** Provide visible guidelines on the type of content welcome, review and approve posts to ensure that they meet guidelines, and thank posters for their willingness to help.

Engagement can also mean commenting on other people's content. When commenting on content not your own, remember the following guidelines:

- **Verify your organization's policies.** Is there an official commenter for your organization? Does anyone have to review or approve the comment before it is posted? Can employees post using their titles and organizational affiliations?
- **Contact blogs and other sites that seem to offer appropriate information and have a number of followers.** You can generally tell the popularity of a blog by how many comments each post receives or how many subscribers it has, but do not forget the many silent readers. Look also for blogs that are repeated or quoted to determine how often they are being read. Post comments or contact the owner to offer content for future posts.

MONITORING CHANGES IN PERCEPTION VIA SOCIAL MEDIA

Just as social media allows the audience unprecedented control of information, it also offers organizations unprecedented access to their audiences. When the first edition of this book was written, audience analysis required labor and resources for interviews; research on how to contact people and who to contact; and time, sweat, and sometimes tears. Social media provides an easier way to interact with your audience, ask questions, and learn. The Red Cross, for example, uses social media to listen to what people need following disasters. Emergency management agencies monitor social media to manage risks during public events such as presidential inaugurations and public protests.

Monitoring changes in perception can be as simple as noting trends in comments on content over time or as elaborate as using computer-based tools to analyze content and run reports. For example, researchers at Southeastern Louisiana University used Twitter to monitor for flu outbreaks, following the rises in patterns of people complaining of flu-like symptoms. They were able to predict the outbreak faster than the Centers for Disease Control and Prevention (CDC), which relies on clinician reporting for its predictions (Southeastern Louisiana University 2010). Medical researchers in Ottawa reported that Internet searches for listeriosis peaked almost a month before officials announced an outbreak (Wilson and Brownstein 2009). Other examples of care communication tools for monitoring social media include Google's Flu Trends (http://www.google.org/ flutrends), which tracks search term use associated with influenza worldwide and shows how searches increase ahead of the number of cases reported; and Health Map (http://www.healthmap.org), which tracks emerging diseases across the globe.

Another way to think about monitoring perceptions is to understand individual mental health of social media users. Researchers have found that social media can reflect major changes in individual psychology, which can be identified through analysis or other computational methods. In care communication, for example, social media content can help identify depression and other mental health issues. University researchers created an algorithm that can determine if people are depressed based on the gloomy filters they put on their Instagram photos (Alba 2016). Another team of risk communication researchers analyzed more than 800 pins and photos on Pinterest that reflected depression. Some posts were straightforward, openly talking about suicidal thoughts or posting images of someone harming him/herself. Other posts were subtler, using dark poetry or depressing messages. These researchers argued that public health experts should be much more proactive on social media, sharing coping strategies to address depression (Guidry et al. 2016).

For cases where active monitoring of specific comments is not feasible by employees (for example, during a crisis), commercial technology tools can automatically scan social media content and then provide digital reports on the analysis. These trends can help identify where changes are needed in tactics (for example, by opening shelters in emergencies) and whether messages being sent through other methods are reaching the intended audience.

Another way to monitor changes in perception is to see how often key words or concepts are showing up on blogs and how the terms are being used. You also can use a portal site that lists a variety of blogs. For example, Technorati.com searches and organizes millions of blogs and other user-generated online content.

Reviewing blogs frequented by the intended audience for risk communication also can yield insights into how perceptions are changing. The tone of a blog, its popularity, and its responses hint at the level of concern about a particular risk. The number of responses and their tendency to agree or disagree show how segmented your audience might be.

> In today's social media era, bad news circulates minutes after it happens. Organizations no longer have the luxury of waiting for a few hours or days before responding to a crisis.
>
> —Amiso George, in George and Pratt (2012, p. 33)

The literacy of those responses provides insight into reading level and fluency.

While such monitoring can bring a wealth of information, risk communicators need to be aware of potential pitfalls. One is the issue of privacy. Twitter and Facebook have been credited by many sources as helping to fuel the Arab uprisings in 2010 and 2011 (for example, see George and Pratt 2012), but repressive regimes can use social media to spy as well. If your monitoring is obvious to audience members or becomes known to them, they may well ask questions. How much information is being kept? How long will it be kept? How will it be used? Some of these questions may already be answered in your organization's policies and procedures. For example, the Congressional Research Service advises that a privacy impact assessment is required for any revised or new information technology system developed through funding by the federal government. The Department of Homeland Security developed such an assessment for sending information via social networking in 2010 and more generally for social media in 2011 (Lindsay 2011).

GUIDELINES FOR SPECIFIC TYPES OF SOCIAL MEDIA

Each type of social media can be used to communicate risk information, but different types lend themselves well to specific uses in care, consensus, and crisis communications, as shown in Table 19.1.

Table 19.1. How Social Media Can Be Used for Various Types of Risk Communication

	Type of risk communication		
Type of social media (as of 2017)	Care communication	Consensus communication	Crisis communication
Social networking sites (for example, Facebook)	Provide compelling content about risk Share stories from those at risk Gather feedback on communication messages and protective actions the audience can take Allow those at risk to counsel and support each other Address misinformation and rumors	Gather insight on appropriate risk management and risk communication approaches Provide live feeds to stakeholder involvement meetings Solicit input on locations for meetings	Provide updates on emergency response activities and protective actions the audience can take Counter misinformation Gather information on those at risk
Blogging and podcasts (for example, Blogger, WordPress, Tumblr)	Provide compelling content about risk Share stories from those at risk Train caregivers to provide additional support to those at risk	Gather feedback on risk management approaches Provide recordings of stakeholder involvement meetings	Coordinate plans before emergencies
Tweeting (using Twitter)	Point to compelling stories on social networking sites, blogs, or websites	Update stakeholders on involvement activities Solicit comments on risk	Provide updates on emergency response activities and protective

Table 19.1. (*Continued*)

Type of social media (as of 2017)	Type of risk communication Care communication	 Consensus communication	 Crisis communication
	Update stakeholders on actions taken Gather feedback on messages or issues	communication or risk management approaches	actions the audience can take Counter misinformation Gather information on those at risk
File-sharing sites (for example, YouTube, Flickr)	Share interviews with those at risk to inspire action Share pictures of consequences to encourage taking protective actions Make statistics more meaningful through graphics (see Chapter 14 for more information)	Share video or slides from stakeholder involvement meetings	Share plans before emergencies
Mapping	Show how risk has changed over time Pinpoint locations for more help in taking protective actions	Solicit input on locations for meetings Show locations of activities on maps Show alternatives to environmental changes	Show spread of risk (for example, fire, flood, or pandemic) Provide directions to protective actions (evacuation routes, emergency shelters) Identify infrastructure or persons at risk

Social Networking Sites

Social networking sites like Facebook and Reddit have numerous pages on care communication issues like drunk driving, child abuse, HIV/AIDS, drug abuse, and mental health. As people share opinions through comments on status updates or posts to pages, consensus can be built around a particular issue, supporting consensus communication. Facebook has also been used for emergency communication.

Tweeting

Tweeting has the potential to be seen by thousands of people, or very few, depending on how often the posts are shared. In general, the key to communicating risk information via tweeting is to share information that will be read and shared by ever-widening groups of people potentially at risk. To determine what exactly made a post memorable enough to share, researchers provided a website that allowed Twitter users to anonymously grade posts (tweets) as worth reading, neutral, or not worth reading. Based on the results, only 36% of tweets were worth reading. Questions were about three times more likely to be judged worth reading compared with "presence maintenance" tweets like "hullo, twitter." Best gambits were questions with a unique hashtag (a way to reach a preset group of people already interested in that type of information), information sharing, self-promotion with content such as links to blog posts, and even random thoughts. Not-worth-reading reasons included being boring, repeating old news, being unclear, having too little content, and using too many hashtags or symbols. Users also did not like whining or hearing about local news when they are not local. Instead, users preferred posts that were personal, honest, transparent, and concise (André et al. 2012).

See Chapter 9 for more information on crafting risk communication messages.

Blogging and Podcasts

Blogs, online commentaries, range from personal journals to sophisticated publications with readership levels at or above the level of mainstream media. Blogs cover any topic with which people have deep expertise and a desire to express it.

The U.S. Transportation Security Administration is a good example of an agency not normally thought of as friendly or transparent that, nevertheless, has an effective, moderated blog. The blog includes candid conversations on everything from traveler watch lists to the latest security screening technology. It even has an "off-topic comments" area for bloggers who want to comment more broadly than the scope of the current post topics. Blogs sometimes include podcasts (digital audio files), or podcasts may stand alone on websites. Though podcast publishers, known as podcasters, offer links for direct download or streaming of their audio content, a podcast is distinguished from other digital media by its ability to be syndicated, subscribed to, and downloaded automatically.

On their websites, the Centers for Disease Control and World Health Organization have dozens of podcasts on health issues worldwide, some in other languages in addition to English. Users can subscribe to podcasts and send feedback about them. Some podcasts also have transcripts online. Past podcast topics have included, for example, vaccines, the Zika virus and pregnancy, healthy aging, mental health intervention, and brain training.

How can you use the power of blogs and podcasts to share information?

- Identify existing bloggers who cover your risk and add them to your media list for distribution of press releases and other media information.
- Post comments on blogs, offering risk information and sharing in the debate. Be careful not to point readers overtly to your organization, which is seen as a breach of etiquette and could derail your efforts.
- Monitor other peoples' blogs on your risk issue of interest. When a blog written by senior public health practitioners criticized the World Health Organization's response to pandemic influenza, an official posted a comment in reply, explaining the organization's stance on the issue.
- Start your own blog. Use informal language, offer fun facts, and make sure that you post regularly.

See the content sharing section of this chapter for more information.

Video-, Image-, and File-Sharing Sites

Social media sites allow users to post their own content for comment by others. At the time of this writing, YouTube hosts videos; Flickr shares photographs; Pinterest and Instagram share photos and videos; and sites like Slideshare.net share presentation materials. Many organizations charged with communicating risk are using these sites to share risk information. For example, eyeSIGHT INTERNATIONAL, an advocacy group that strives to collectively work with leading World Health Organization partners in the effort to prevent avoidable blindness worldwide, has "its story in pins" on the Pinterest site showing its services, facilities, and volunteers to encourage usage and support.

To make the most effective use of these sites for risk communication, consider the following:

- **Be aware of permission requirements.** You may need to get written permission from those you photograph before including the information online. If your organization is not the original photographer, you may also need permission from the photographer to post the picture. Likewise, any music on videos must be in the public domain, have been bought for the purpose, or have permission on file for its use. Pages that do not adhere to permission requirements can be removed by the social media site and in some cases, have been sued by the owner of the material.
- **Do not worry about Hollywood quality for video or high resolution for still photographs**. Optimize for the web, or personal digital devices, and make sure that the information is useful to your audience.
- **Ensure that anything you post would be suitable for your audience**. That means no overly graphic posts for care (for example, car crashes to

advocate seatbelt use or avoiding texting while driving) or crisis communications (for example, cadavers in rubble after an earthquake or tornado). It also means that information should be put in context to avoid misunderstandings.

- **Specify ownership rights of what you post**. For example, you can include copyright and usage terms in photos you post to your organization's Flickr channel.

Mapping

Maps have proven especially useful for crisis communications, easily showing the spread of the risk, safe evacuation routes, and shelter locations. However, university researchers in geography and disaster management in Germany found that maps could be used to improve risk perception, help people more coherently frame risks, and establish greater credibility for the communicating organization (Dransch et al. 2010).

Maps can be created using many online tools or through partnerships with online map developers such as Google. The key, once again, is interaction. Provide ways for users to drill down for more information, enlarge sections of most interest to them, and perhaps even add information to improve the representation. See Chapter 14 for more guidelines on using visuals to communicate risk information.

Crowdsourced maps showing on-the-ground needs are increasingly being used in emergencies such as natural disasters; see Chapter 22 for information and examples.

EVALUATING SOCIAL MEDIA EFFECTIVENESS

Evaluation is often the most overlooked aspect of risk communication efforts, and social media is no exception. With a variety of data analytics tools available, it's easy to count quantitative metrics such as number of followers, views, shares, and online subscribers. As of 2017, various analytics tools were available for the following:

- Measure the reach and other metrics of your messages, such as shares, retweets, and replies
- Provide information on your Facebook and Twitter communities
- See what is being said on social media about you or your organization
- Identify relevant hashtags
- Provide analytics on your websites (for blogs)
- Assess the presence of your organization or identity on various social networking sites

Paid social media, such as promoted posts on Facebook, often give you a "dashboard" of engagement information such as number of people reached, their locations, click-through rates, and so on.

Those kinds of metrics are helpful for evaluating general awareness and, over time, growth in reach and engagement. Such measurements also can help you understand which social media channels your target audiences most use. They can also help you see if you are reaching influencers, for example, if trusted community or opinion leaders follow you, or repost or comment favorably on your content.

Because comments provide direct and immediate feedback, they help you understand in real time what kind of content resonates with people, what issues or problems they may still have, whether they trust you, and what they may be misinterpreting or not understanding. You can use these insights to further understand your stakeholders and adjust your social media conversations accordingly.

Others have found that tracking how far a message spreads is a more valuable metric for the engagement over social media. For example, how many times is a message retweeted on Twitter or how many links does a blog post receive on other blogs or websites? Also important is the growth over time. Has your following increased over a month, a quarter, a year? These types of performance metrics can help determine the effectiveness of your social media work and determine whether the time and cost invested have been worthwhile.

Measuring the number of visitors, shares, and comments is one thing. It becomes more challenging to understand to what extent your social media campaigns contributed to engagement, new understanding, attitude change, or behavior change—unless you ask people directly. This is also challenging because people typically see the same information from many sources and don't necessarily remember which ones caught their attention.

For understanding real impact, you will likely need to use traditional methods to ask your stakeholders directly through surveys, interviews, focus groups, and other standard evaluation methods. See Chapter 21 for more on communication evaluation.

Two professional sources may help with social media evaluation. The Conclave on Social Media Measurement Standards defines and promotes standards and best practices for social media measurement. As of 2017, more than 100 organizations, industry associations, and communication agencies have pledged to support the standards. The Complete Social Media Measurement Standards (Conclave on Social Media Measurement Standards 2013) provides evaluation guidance, criteria, and an evaluation template. It defines five categories of metrics: (1) impressions and reach, (2) engagement and conversation, (3) influence, (4) opinion and advocacy, and (5) impact and value. For each metrics category, the Conclave defines terms, and in some cases, best practices for evaluation. Another professional resource is the Digital Analytics Association, which provides specific "recipes" (processes) from its members for analyzing dozens of metrics about digital data streams, including social media.

Case Study: When Your Social Media Campaign Fails

Because social media is interactive, you're always taking a chance that, when you ask people to chime in, they don't say what you'd hoped. In fact, it can go horribly wrong, very quickly. Anything that could relate to food safety is a particular concern.

McDonald's launched its #McDStories hashtag in 2012, asking customers to share their memories of eating at its restaurants. Instead, customers hijacked the hashtag, sharing food poisoning horror stories and complaints about ingredients. Sixty-eight percent of tweets using the hashtag were negative (Thomases 2012). Example: "#McDStories: My brother finding a fake fingernail in his fries."

The campaign only lasted 2 hours before McDonald's pulled it. The company tried to deflect the negative remarks by using a new, inoffensive hashtag (#littlethings)—but the damage had already been done.

What happened? McDonald's didn't explain what the hashtag #McDStories meant or how it was supposed to be used. And blatantly self-serving company promotions are ripe for exploitation in the Twitterverse.

Make sure your social media campaign is part of a larger communication strategy and understand what you expect to get out of it. Check your candidate hashtags carefully before launching them to make sure they can't be misperceived or linked to an inappropriate hashtag that's already in use. Once your social media campaign launches, assign staff to watch for and reply to responses, as well as post original content when appropriate.

DEALING WITH FAKE NEWS

As mentioned in Chapter 16, fake news, sometimes called false news, is deliberate misinformation or hoaxes, published typically with the intent to mislead for financial or political gain. Chapter 16 discussed fake news in the context of traditional news media. Here, we touch on fake news in social media.

Social media can be the original source of a fake news item; it can also serve as the channel for spreading and amplifying misinformation. People also can use social media less maliciously, by inadvertently sharing misleading, no longer current, or incomplete risk information. Still, the damage is real.

Fake news or misinformation can lead to dangerous behavior when people misunderstand a risk. In India, for example, misinformed health advice is widely shared in social media platforms like the WhatsApp messenger. Here's a popular hoax that was making the rounds in 2017: An image of a blister pack of pills, warning recipients to avoid certain brands of the pain reliever acetaminophen because "doctors advise that it contains 'Machupo' virus, one of the most dangerous viruses in the world, with a high mortality rate." Fact-checkers like India's Check4Spam are particularly valuable in debunking such myths, especially when some health information may seem legitimate because alternative medicine is part of Indian culture (Sachdev 2017).

When Hurricane Harvey devastated Houston, Texas, in 2017, fake news on social media claimed that reentry to Corpus Christi was banned and that Houston had turned off its water supplies. A widely circulated meme giving out an emergency number for the U.S. Coast Guard actually reached an insurance company. In the midst of the crisis, officials had to spend time correcting these erroneous claims.

Around 2016, during controversial election processes in the United States and Europe, social media companies began paying more attention to their platforms' role in contributing to fake news, and acting to counter it. Artificial intelligence and algorithms began playing a larger role in recognizing and eliminating fake news online.

For example, in 2016, Facebook began using machine learning and partnering with independent fact-checkers worldwide to label inaccurate news. As of 2017, readers could click on posts and report them as false news. Once a story is determined to be fake news, Facebook demotes its position on the news feed to reduce its distribution. Facebook also rolled out its "related articles" feature in 2017, which invites users to see other perspectives on the same topic, encouraging them to think twice before sharing a story.

In 2017, Google retooled its search engine to prevent sites that peddle fake news, hoaxes, and conspiracy theories from appearing in its top results. New tools allow users to report misleading or offensive content. Low-quality content is demoted. Google also introduced a Fact Check tag in its search results. If you ask for information about a highly contested subject, Google serves a page from an independent fact-checker site at the top of your results. The page shows information about the claim, the person who made the claim, and whether the fact-checkers think it's true.

Various software tools are available to counter the spread of misinformation online. As of this writing, two examples were Hoaxy®, which displays fact checks on online information by key word, and Botometer®, which scores Twitter account activity based on the likelihood that the account is a bot, rather than a human.

How do you counter false or misleading risk-related information in social media? We've adapted some guidelines from crisis management expert David Honour (2016):

- **Prepare a rapid response capability.** Examine what's already being said about your risk topic among the most widely used social media platforms. Consider what other kinds of misinformation could be spread about your risk and which entities would be spreading it. What kinds of misinformation would be detrimental enough to respond to, and what would be less crucial and could be ignored? For the action threshold, agree on a process and approvals, and assign roles and responsibilities.

- **Monitor the landscape.** Once your risk communication efforts have begun, monitor social media in real time to see what is being said. Online topic monitoring tools can help with this.
- **Check the location source.** Facebook, Twitter, Instagram, and other social posts are often geo-tagged, meaning they show the physical location of where something had been posted. Enter the locations into Google Maps to see where they're coming from. If the person claims to be on the ground during a disease outbreak, for example, see if the geo-tag corroborates that. But be aware that this can be gamed, too—software can make devices appear to be in places they're not.
- **Calibrate your response (quickly).** Don't overreact, or you could make it worse. To determine whether you need to act, consider the following:
  - How damaging to the communication effort is the information? For example, if social media rumors are suggesting that people not evacuate from their homes before a hurricane because the roads might be too crowded, that's an issue to be addressed.
  - How many people are talking about it?
  - How influential are the people commenting on it? Are they likely to be trusted by those at risk?
- **Correct inaccuracies and communicate your own narrative.** Put your response plan into action to provide accurate, consistent information. If necessary, consider using paid media (for example, Google AdWords) to ensure that your message is getting through. Brief your own communication team and organization as well. Not only will that help build trust and transparency, but will also help provide consistency when they are talking with other stakeholders.
- **Continue to monitor social media.** Adjust your response as necessary.

Case Study: A Botnet Fights Fake News with Real News

Fake news can become viral using botnets, managed by both software agents and unaware users, whose accounts have been hijacked for that purpose. In other words, malware can take control of large numbers of user accounts, and an army of bots starts sharing fake news via millions of people's Facebook or Twitter feeds.

The World Economic Forum used a hashtag #wef12 for its meeting in Davos in 2012. The hashtag was mobbed by a malicious bot. The Forum's digital communication team spent all night working with Twitter to manually delete thousands of unmentionable tweets (Stroppa and Hanley 2017).

After that distressing experience, the Forum developed an experimental Twitterbot that could follow specific news and commentaries about the Davos meeting and provide context or corrections. In 2017, the Forum identified an article published by Fox News that claimed that citizens' money was being used to bankroll the Davos Forum. The Forum drafted a lengthy, accurate reply and published it on its own website. Then the Forum programmed the bot to identify significant users on Twitter—those who were verified users, or who had over 2,000 followers—and reply to those users with an @mention, linking to the accurate story. The bot account was transparent: openly owned by the World Economic Forum, and labeled as automated.

The bot helped social media users quickly identify fake news and respond appropriately.

CHECKLIST FOR SOCIAL MEDIA

- ☐ Audience access to and usage of social media have been considered in choosing how to engage.
- ☐ Staff have been identified with time and ability to engage the audience using social media.
- ☐ The organization has guidelines for its use of social media, and such use is consistent with industry regulations.
- ☐ Social media use is part of a wider risk communication plan.

  When sharing content:
  - ☐ Sites share consistent information that is attractively presented.
  - ☐ Content consists of information the audience cares about.
  - ☐ Content is easy for the audience to share.
  - ☐ Mechanisms are in place to screen comments and determine appropriate people to accept as friends or followers.

  When engaging with stakeholders:
  - ☐ Guidelines are in place to deal with misinformation or difficult users as well as users posting content.
  - ☐ Organizational policies for engagement have been followed.

    When monitoring changes in perception:
  - ☐ An approach has been agreed upon including how to ensure privacy for individuals.
  - ☐ Information gained is being used to inform further risk communication efforts.
- ☐ The type of social media most effective for the risk communication effort is being used, and best practices are being followed. Fake news is being monitored and, when appropriate, responded to.

REFERENCES

Alba, A. 2016. “Researchers Build Instagram Algorithm that Identifies Depressed People Based on Filter Choices.” *New York Daily News*, August 24. http://www.nydailynews

.com/news/national/instagram-algortihtm-depressed-article-1.2763929 (accessed August 20, 2017).

André, P., M.S. Bernstein, and K. Luther. 2012. "Who Gives a Tweet? Evaluating Microblog Content Value." *Presented at the Association for Computing Machinery Conference on Computer Supported Cooperative Work, February 11–15, 2012, Seattle, Washington*.

Bacardi, F. 2017. "United Airlines Announces 10 Policy Changes in Response to Passenger Removal Incident." *E!News*, April 27. http://www.eonline.com/news/846487/united-airlines-announces-10-policy-changes-in-response-to-passenger-removal-incident (accessed January 29, 2018).

Center for Biosecurity. 2012. *After Fukushima: Managing the Consequences of a Radiological Release*. University of Pittsburgh Medical Center, Baltimore, Maryland.

Conclave on Social Media Measurement Standards. 2013. Complete Social Media Measurement Standards. http://docs.wixstatic.com/ugd/0b15ae_c4b5f3e188e143cca1ca263376fbb132.pdf (accessed August 14, 2017).

Dransch, D., H. Rotzoll, and K. Poser. 2010. "The Contribution of Maps to the Challenges of Risk Communication to the Public." *International Journal of Digital Earth*, 3 (3): 292–311.

George, A. M. and C. B. Pratt, eds. 2012. *Case Studies in Crisis Communications: International Perspectives on Hits and Misses*. Routledge, New York.

Guidry, J., Y. Zhang, Y. Jin, and C. Parrish. 2016. "Portrayals of Depression on Pinterest and Why Public Relations Practitioners Should Care." *Public Relations Review*, 42 (1): 232–236. http://www.sciencedirect.com/science/article/pii/S0363811115001113 (accessed August 20, 2017).

Haataja, M., A. Laajalahti, and J. Hyvärinen. 2016. "Expert Views on Current and Future Use of Social Media Among Crisis and Emergency Management Organizations: Incentives and Barriers." *Human Technology*, 12 (2), 135–164. doi: 10.17011/ht/urn.201611174653.

Honour, D. 2016. "How to Prepare for and Manage a Fake News Attack." Continuity Central. http://www.continuitycentral.com/index.php/news/business-continuity-news/1633-how-to-prepare-for-and-manage-a-fake-news-attack (accessed August 12, 2017).

Internet World Stats. 2017. *Usage and Population Statistics*. http://www.internetworldstats.com/stats.htm (accessed May 20, 2018).

Lefebvre, R. C. 2007. "New Technology: The Consumer as a Participant Rather Than Target Audience." *Social Marketing Quarterly*, 13 (3): 31–42.

Leiderman, L. 2012. "Policy Making in 140 Characters or Less: NATO and Social Media." Research Paper No. 77, NATO Defense College, Rome.

Lesperance, A. M., M. A. Godinez, and J. R. Olson. 2010. Social Networking for Emergency Management and Public Safety, PNNL-19601. Pacific Northwest National Laboratory, Richland, Washington.

Li, C. and J. Bernoff. 2008. *Groundswell: Winning in a World Transformed by Social Technologies*. Harvard Business Press, Boston, Massachusetts.

Lindsay, B. R. 2011. *Social Media and Disasters: Current Uses, Future Options, and Policy Considerations*, 7–5700, Congressional Research Service, Washington, DC.

Office of the Chief of Public Affairs. 2011. *U.S. Army Social Media Handbook*. U.S. Army, Online and Social Media Division, Office of the Chief of Public Affairs, Washington, DC.

Pew Research Center. 2018. “Social Media Fact Sheet.” http://www.pewinternet.org/fact-sheet/social-media/ (accessed May 20, 2018).

Sachdev, C. 2017. “Fake Medical News Can Now Be Fact-Checked in India.” Northwest Public Radio. Goats and Soda, NPR’s Global Health and Development Blog. May 12. http://www.npr.org/sections/goatsandsoda/2017/05/12/526687362/fake-medical-news-can-now-be-fact-checked-in-india (accessed August 12, 2017).

Seetharaman, D. and G. Wells. 2017. “Hurricane Harvey Victims Turn to Social Media for Assistance.” *The Wall Street Journal*, August 29. https://www.wsj.com/articles/hurricane-harvey-victims-turn-to-social-media-for-assistance-1503999001?mod=rss_Technology (accessed September 3, 2017).

Shearer, E. and J. Gottfried. 2017. “News Use Across Social Media Platforms 2017.” Pew Research Center. September 7. http://www.journalism.org/2017/09/07/news-use-across-social-media-platforms-2017 (accessed May 20, 2018).

Stroppa, A. and M. Hanley. 2017. “How Can We Defeat Fake News?” World Economic Forum, February 8. https://www.weforum.org/agenda/2017/02/how-can-we-defeat-fake-news-automate-the-right-to-reply/ (accessed August 12, 2017).

Southeastern Louisiana University. 2010. “Twitter Used to Predict Flu Outbreaks.” Science Daily. https://www.sciencedaily.com/releases/2010/09/100928153809.htm (accessed October 18, 2017).

Thomases, H. 2012. “McDonald’s Twitter Mess: What Went Wrong.” Inc.com, January 25. https://www.inc.com/hollis-thomases/mcdonalds-mcdstories-twitter-mess.html (accessed January 28, 2018).

Tinker, T. 2009. *Special Report—Expert Round Table on Social Media and Risk Communication During Times of Crisis: Strategic Challenges and Opportunities*. American Public Health Association, Washington, DC.

Wilson, K. and J. S. Brownstein. 2009. “Early Detection of Disease Outbreaks Using the Internet.” *Canadian Medical Association Journal*, 180 (8): 829–831.

ADDITIONAL RESOURCES

Centers for Disease Control and Prevention. 2012. *CDC’s Guide to Writing for Social Media*. Prepared by the Electronic Media Branch, Division of News and Electronic Media, Office of the Associate Director of Communication. https://www.cdc.gov/socialmedia/tools/guidelines/pdf/guidetowritingforsocialmedia.pdf (accessed September 9, 2017).

Centers for Disease Control and Prevention. 2011. The Health Communicators Social Media Toolkit. https://www.cdc.gov/socialmedia/tools/guidelines/pdf/socialmediatoolkit_bm.pdf (accessed September 4, 2017).

20

PARTNERSHIPS

It has been said it takes a village to raise a child. Sometimes it takes a partnership with organizations outside yours to effectively communicate risk. The National Oceanic and Atmospheric Administration, for example, advises working with a variety of partners, including faith-based organizations, so that the risk information has the greatest chance of reaching the audience from a trusted source (NOAA 2016). The U.S. Army Medical Command found that partnerships with subject matter experts or those affected by risks led to better decisions supported by a wider audience while allowing process transparency (Geckle and Dunbar 2014).

In a partnership, each member brings something to the table. One agency may supply the subject matter expertise on the hazard, another the communication expertise. An influencer—someone your audience respects and listens to—may offer access to thousands or even millions of people through the news media, social

> The U.S. Army Medical Command found that partnerships with subject matter experts or those affected by risks led to better decisions supported by a wider audience while allowing process transparency.
> —Geckle and Dunbar (2014).

Risk Communication: A Handbook for Communicating Environmental, Safety, and Health Risks, Sixth Edition. Regina E. Lundgren and Andrea H. McMakin.

© 2018 The Institute of Electrical and Electronics Engineers, Inc., and Regina E. Lundgren and Andrea H. McMakin. Published 2018 by John Wiley & Sons, Inc.

media, blogs, or video streams. Those at risk may help spread the word to others who may be affected.

A partnership can take many forms. At a simple level, it may involve agreeing to share links between online properties or publishing your content either online or through information materials. Partnerships can also involve sharing resources—equipment, staff, funding. At its highest level, wide groups of partners share everything in a full risk communication campaign. For example, communicating the risk of Ebola in 2014 in Liberia involved police, village chiefs and elders, and known aid workers, while locals traced contacts. The effort is credited with decreasing the number of cases of the disease there (Giahyue and Farge 2015).

The advantages and disadvantages of working in partnership are discussed in Chapter 10. This chapter discusses categories of partnerships, general principles for working in partnership, identifying and approaching influencers, addressing requests for partnerships when you are the influencer, and evaluating partnerships, including determining when it is time to end them. For using stakeholder involvement as a risk communication method, see Chapter 17.

CATEGORIES OF PARTNERSHIPS

There are many types of partnerships. For example, some are advisory, some are involved in decision making, some have legal responsibilities, some are informal, and some are sponsorships.

Task Forces and Advisory Groups

Sometimes, it makes sense to have stakeholders and partners participate in deliberations through a more structured, long-term process. Advisory groups or task forces, composed of stakeholder group representatives, can be an effective way to build consensus. They have a specific mission, and you have an obligation to take their suggestions and input seriously. As suggested by the U.S. Centers for Disease Control and Prevention (CDC), you can facilitate the decision-making processes of these groups by using the following steps:

- Define the problem or issue, including its scope.
- Define the scope, or charge, for the advisory group.
- Identify available options. Present all known information about alternatives.
- Analyze the costs and benefits, weaknesses and strengths, and pros and cons of each alternative.
- Establish criteria for a solution, including the “must” versus “want” criteria.

- Be able to express why one alternative was chosen over the others. The chosen alternative will be such that the highest number of people will be helped with a minimum disruption to self-reliance and community sovereignty (U.S. Department of Health and Human Services 2014).

For more information on working with stakeholders, see Chapter 17.

Crisis Response Partnerships

Emergency planning is another area that typically involves multiple organizations. Because roles and expectations can vary widely, it is particularly important to understand and agree on the role of the partners in advance. According to the CDC (U.S. Department of Health and Human Services 2014), there are at least three ways the term "coordination" can be used by disaster response groups:

- Coordination can be as simple as informing others about what an organization will be doing in response to a crisis. Often, this is effective, but can create the impression that one group or agency is "doing it alone."
- Coordination may also involve centralizing decision making within a particular agency or with key officials. In such cases, managers control the response, and coordination is a function of a centralized authority.
- Coordination may be based on mutually agreed upon cooperation that is sometimes negotiated. Participating groups reach an agreement on how to carry out crisis response tasks. In these cases, groups and agencies share authority.

Crisis coordination, according to the CDC, implies a minimal level of involvement between organizations to achieve synchronized crisis response and mitigation. Crisis collaboration suggests a deeper alliance where each values the other's interdependence and promotes equal input of participants in shared decision making. Collaboration is based on shared goals of effective crisis response and mitigation, shared values, and usually a longer history of interaction. In pre-crisis planning meetings with response organizations, discuss and clarify the goals of a crisis response. This will lessen potential conflicts, lead to more effective communication with stakeholders, and enhance the ability of response organizations to create consistent messages.

Legal Partnerships

Sometimes the law requires a partnership. The National Environmental Policy Act mandates involvement by federal agencies associated with the action being evaluated for potential environmental consequences. Various state and federal agencies often cooperate when regulating the cleanup of a hazardous waste site. At a minimum, partnering agencies will expect some form of review of information being released about the effort. In other cases, agency representatives will work side by side to develop, vet through their agency, and release risk information. As with other forms of partnerships, agreeing on roles, expectations, process, and timelines is key to success.

Informal Partnerships

Some partnerships lack the formality of a task force, team, or legal partnership. These may involve a loose coalition of agencies and organizations who keep each other apprised of risk assessment, management, or communication activities in a particular area. For example, the local health department may notify area schools when new literature is available on measles, rumps, and rubella to share with parents and caregivers. Roles are less codified in these types of partnerships, but expectations are still important. Sending materials to a partner who promptly throws them in the trash as junk mail is a waste of resources and utterly fails to communicate risk.

Sponsorships

When resources are constrained, and they often are in risk communication, finding another organization to sponsor an effort can expand the number of at-risk people reached with your risk communication message. Then too, if your organization has an interest in a particular risk but lacks the skills or opportunities to reach those at risk, sponsoring another organization with those skills and opportunities may be an effective way to meet your goals. Some sponsorships require the outlay of funds; others involve in-kind support (staff, space, distribution mechanisms, etc.). Again, work out expectations beforehand. Will the sponsor review materials before release? How will the sponsor be noted—use of logos and slogans? Names of staff or board of directors listed? Corporate description prominently featured? A brief note of thanks in an obscure location in the information? See below for more general principles on working in partnership.

GENERAL PRINCIPLES FOR WORKING IN PARTNERSHIP

Choosing a partner requires careful thought. Your organization may be seeking resources, funding, expertise, or credibility to augment risk communication efforts. Table 20.1 lists general types of partners, what they might contribute, what they may expect from the partnership, and examples for care, consensus, and crisis communication.

Individuals with influence are discussed in the following section. Chapter 16 discusses working with the news media as a partner. Regardless of the type of partner you choose to reach your risk communication goals, make sure roles, contributions, and expectations are discussed and documented before beginning the effort.

Table 20.1. Types, Contributions, and Expectations of Potential Partners

Potential partner	Contribution	Possible expectations	Examples
Federal and state government agencies	Subject matter expertise, risk communication expertise, regulatory compliance, funding, meeting locations	To lead, to approve release of information, to focus on a constituency, to receive some credit for the work	U.S Centers for Disease Control and Prevention (care and crisis), U.S. Environmental Protection Agency (care and consensus), State Department of Labor (care)
Local government agencies	Subject matter expertise, regulatory compliance, audience understanding, meeting locations	To lead, to approve release of information, to receive some credit for the work	Fire departments (crisis), Public Health Department (care), Neighborhood Council Program (consensus)
Academia	Subject matter expertise, risk communication expertise, staffing (students), libraries, meeting locations	To publish research or case studies on the work, to have advice acted upon, to work on school schedule, to receive funding, to receive some credit for the work	Universities (care and consensus), community colleges (care and consensus), campus police departments (crisis)
Schools	Understanding of families and children, meeting locations, distribution of information	To focus risk on children and families, to work on school schedule	Elementary schools (care and crisis), middle schools (care and crisis), high schools (care, consensus, and crisis)
Industry	Subject matter expertise, risk communication expertise, proprietary information, meeting locations, funding, distribution of information	To protect proprietary information, to hold back some information, to approve materials, to receive some credit for the work	Local power plant (crisis), public relations firm (consensus), medical device manufacturer (care)

(*continued*)

Table 20.1. (*Continued*)

Potential partner	Contribution	Possible expectations	Examples
Professional societies	Subject matter expertise, risk communication expertise, distribution of information	To benefit society members, to receive some credit for the work	American Public Health Association (care), International Association for Public Participation (consensus), North American Hazardous Materials Management Association (crisis)
Non-profit cause-based organizations	Subject matter expertise, risk communication expertise, staffing, funding, distribution of information	To see their cause featured prominently, to call for financial support, to receive some credit for the work	American Lung Association (care), Consensus Building Institute (consensus), American Red Cross (crisis)
Recreational or entertainment organizations	Connection to audience, distribution of information	To benefit constituency, to receive some credit for the work	Ducks Unlimited (care), retreat center (consensus), local radio station (crisis)
Faith-based organizations	Connection to audience, staffing, meeting locations, distribution of information	To be of help, to be provided a safe space to work	Church-based addiction group (care), minister (consensus), synagogue or mosque members as phone operators (crisis)
International coalitions or agencies	Vast networks of communities, funding, staffing, subject matter expertise, risk communication expertise, distribution of information, translations	To lead, to ensure risk aligns with purpose and audience, to provide information in multiple languages and contexts	World Health Organization (care, consensus, and crisis), European Food Safety Authority (care and crisis)

Base partnerships on a common purpose of serving the community, on mutual needs, and shared understanding of what is necessary during a crisis.
—Reynolds and Seeger (2014)

Examples of partnerships abound. In a care communication effort, the World Health Organization partnered with the Ethiopian Orthodox Church, Ministry of Health, UNICEF, United National Office for the Coordination of Humanitarian Affairs, and others to improve water safety and toilet access around holy water sites used by pilgrims for spiritual cleansing and physical healing (WHO Regional Office of Africa 2017). To help reach consensus, the European Food Safety Authority agreed to share opinions and expertise on methods associated with risk data collection, risk assessment, and risk communication with the Chilean Food Quality and Safety Agency (European Food Safety Authority 2016a) and the China National Centre for Food Safety Risk Assessment (European Food Safety Authority 2016b). Staff from the U.S. Department of Homeland Security and the U.S. Department of Health and Human Services on the Mass Human Chemical Decontamination Working Group partnered with subject matter experts in government, industry, and academia in the fields of emergency response, emergency medicine, toxicology, risk communication, behavioral health, and other areas to develop guidelines for decontaminating patients in a mass chemical exposure incident (Cibulsky et al. 2014).

Many books and blog posts have been written about building partnerships with agencies and organizations like those mentioned above. When communicating risk, several key principles apply:

- **Match goals and values among partners**. For any risk, a number of organizations and individuals may be interested. Some may disagree on the magnitude of the risk and seek to encourage what subject matter experts might consider risky behavior. Think about tobacco companies or alcohol distilleries. While both have taken steps to encourage responsible use of their products, their goals won't align with an agency determined to decrease use. Choose partners with goals and values that align with those of your organization.
- **Look for equity of outcomes**. When organizations or individuals stand to gain from the risk communication effort, they are more likely to commit resources for the length of the partnership. Each partner needs to gain something from the partnership. For example, the State of Florida reached out to MasterCard® to partner on a hurricane preparedness ad that made use of the company's "Priceless" tagline. The effort not only increased preparedness in Florida homes, but garnered media attention that led MasterCard® to keep the campaign running longer than anticipated, reaching even more people (CDC 2009).
- **Confirm a good reputation with your target audience**. In various publications, risk communication legend Dr. Vince Covello points to four traits an

agency must exhibit to maintain trust and credibility with its audience: empathy, honesty, competence, and commitment. More recent research by Covello and colleagues (Peters et al. 1997) indicates that knowledge and expertise, honesty and openness, and concern and care are key determinants of trust and credibility. Choose partners your audience perceives as embodying these traits (and make sure that your organization embodies them as well).

- **Ensure appropriate training**. Some agency staff seem natural risk communicators. Others have had extensive training in the art. Make sure those who will be partnering on the risk communication effort have sufficient training and experience to contribute in a meaningful way.
- **Agree on ownership**. Any sort of partnership will likely generate content—information materials, online postings, graphics, slogans, and so on. Then too, organizations have logos and other information that may be proprietary. Nondisclosure agreements may be necessary in some cases to safeguard information. Even without something so formal, knowing what information can be shared freely and what belongs to each organization will help keep communication activities running smoothly.
- **Agree on resources and approvals**. Partnerships may require the mingling of funds. Where that is not fiscally or legally possible (for example, government agencies cannot allocate funds to outside organizations without using a contracting process), clearly identify which partner will be funding which activity. Likewise, determine approval processes early. Who controls the message? Does each partner have to review every release of information, or is one partner autonomous from the other?

Document agreements in communication plans and share them widely. For more information on developing communication plans, see Chapter 12.

WORKING WITH INFLUENCERS

The concept of an influencer comes from marketing. Rather than attempt to reach a large portion of the public with a message or a product, companies approach individuals who have influence over the target audience. These individuals may be sports heroes, famous actresses, pop music stars, or well-known scientists. For example, when talk show host, actress, and entrepreneur Oprah Winfrey first introduced her book club, sharing books that she personally loved, the chosen books sold in such numbers that publishers had to rush in second and third printings to satisfy demand. Influencers can also be lesser known individuals or organizations with a large online following. The key trait is that an influencer's audience looks to the influencer for advice and puts that advice into practice.

Around the world, a number of organizations are turning to influencers to help share risk information, generally for care and crisis communication. For example, Wego Health developed an online platform to link pharmaceutical companies, hospitals, and medical device manufacturers with influencers who had specific diseases. Those influencers shared information and product advice with their audience, many of whom either suffered from the same disease or had friends or family members affected (Molteni 2017).

Some influencers will share information about your risk with no financial incentive. Perhaps someone they know has been hurt by the risk. Bestselling author Brenda Novak allied her fans and raised more than $2.5 million for diabetes research after her son was diagnosed with type 1 diabetes in kindergarten. Others may find your story of need inspiring. Sometimes, however, influencers will expect to be paid for their participation in your partnership.

The following sections describe how to identify influencers for your particular risk, how to approach influencers, and how to choose partnerships when you are the influencer.

Identifying Influencers

A good way to identify influencers is to ask your target audience. One of the areas in your audience analysis should include determining where your audience goes for information on risks. Do they search online for credible websites or blogs? Which ones do they find most helpful? Do they ask friends and family on social media? Which groups do they join? Who dominates the conversation in those groups? Which newspapers, magazines, or professional journals do audience members subscribe to?

If the information from your audience doesn't provide enough clues to identify which individuals or organizations influence their thinking, or you cannot gather information from your audience, try searching online. For more information on learning about your audience, see Chapter 8.

Once you have a list of potential influencers, research them to determine the following characteristics:

- **Demographics**. How well does their audience align with yours? Are the ages, genders, geographic location, and other demographics a match based on your audience analysis?
- **Reach**. How many followers do they have on their chosen platform? How many responses do they get on reports or posts and how often are those responses positive? Be aware that smaller numbers may not mean lesser influence. If the audience is closely aligned with yours, the influencer may still be a good choice to share information.
- **Timeliness**. How often do they share information? If you are conducting care communication, a monthly post may be sufficient, if it reaches to the heart of the audience whose behavior you are trying to change. If you are planning for crisis communication, you will want an influencer who interacts with the audience more frequently.

- **Knowledge and experience**. How often is this influencer quoted, cited, or linked to by others in the field? How well known is the influencer for having a stake in the risk?
- **Credibility**. Are there scandals and backlash against the influencer? While nearly every online personality will attract negative comments from time to time, if the majority of comments express skepticism and hostility, it might be best to steer clear.

The European Centre for Disease Prevention and Control (2016) advocates using a free social media monitoring tool such as TweetDeck or Hootsuite to determine influencers to approach for partnering. Chapter 19 provides additional information on using social media tools for research of this type.

The bottom line: Will this influencer allow you to reach your audience early with credible information, enhancing your reputation and theirs?

Approaching Influencers

When it comes to approaching influencers to ask to partner, consider them as you would another segment of the audience. What is their preferred method of communication—an introduction from a trusted colleague, directly through e-mail or physical mail, a message on social media? What information will they need to make a decision on whether to partner with you?

Know too what you want the influencer to provide. A generic request for assistance may be passed over by busy bloggers or celebrities. When possible, offer a range of possible ways to partner so that the influencer can select something that fits in his or her time and interests.

Remember to stress the benefits to the influencer. Can you give their audience needed information they can get in no other way? Share an insightful anecdote they would find compelling? Give them access to a subject matter expert they would be hard-pressed to book otherwise? Remember, every member needs to gain something for the partnership to be successful.

If appropriate, offer to develop the content yourself. Provide graphics or video to augment the information. When the influencer has fulfilled his/her part of the partnership, be sure to offer your thanks.

Some of the suggestions in Chapter 16 may also provide insights into how to approach influencers.

When You Are the Influencer

If you are in the enviable position of having your organization be the most respected voice associated with a risk, people may approach you to act as an influencer. The same considerations of aligned goals and values, outcome equity, protection of reputation, ownership of information, and approvals mentioned earlier in this chapter apply in this situation. You've worked hard to develop trust and credibility with your audience. Only agree to partner with those who will take the same care.

When approached to partner, request the same information you would offer to another influencer. How will this partnership help you be first to your audience with credible information? You might also consider developing guidelines specific to your situation to evaluate such requests.

EVALUATING AND ENDING PARTNERSHIPS

Sometimes partnerships end naturally, at the completion of an agreed upon project or when funding has been exhausted. Sometimes the partnership fails to yield the outcomes expected. Like any other method of risk communication, partnerships should be evaluated to ensure they meet the goals of the communication effort. In addition to the suggestions offered in Chapter 21, consider the following as areas for evaluation:

- **Expanded reach**. Did working in partnership allow you to reach a new or larger segment of your audience? Did the partner offer faster access or higher quality information than your organization could have provided alone?
- **Ease of partnership**. Were communication lines clear or muddled? Did the processes serve to propel the effort forward or bog it down? How quickly was the provided information approved? Was the work required to maintain the partnership commensurate with the benefits?
- **Protection**. Was propriety information kept confidential? Were personal assets used appropriately? Did the partnership enhance your organization's reputation as a risk communicator?

If the reach, ease of partnership, and protection of reputation are less than your organization's expectations, you may want to rethink continuing with the partnership. Some issues, such as improving processes or reestablishing lines of communication, may be relatively easy to fix. Others may be so firmly entranced as to make them impractical to change. In such cases, severing the partnership may be necessary. Try to do so in a way that will not damage your reputation and leave the door open for continued partnerships in the future.

CHECKLIST FOR PARTNERSHIPS

☐ The type of partner has been identified, along with roles, contributions, and expectations.
☐ The partner's goals and values align with the organization's.

- ☐ Each partner has equity of outcome. Everyone gains something from the association.
- ☐ Partner staff have been trained in risk communication, if needed.
- ☐ Each partner agrees on:
  - ☐ ownership of information and graphics
  - ☐ ownership of slogans
  - ☐ appropriate use of logos and proprietary information
  - ☐ resources contributed
  - ☐ approvals and the approval process
- ☐ Nondisclosure agreements have been signed, if needed.
- ☐ Partnership agreements are documented in the communications plan.
- ☐ Influencers were identified by
  - ☐ asking the audience
  - ☐ online searching
- ☐ Potential influencers were evaluated for
  - ☐ demographics
  - ☐ reach
  - ☐ timeliness
  - ☐ knowledge and experience
  - ☐ credibility
- ☐ Influencers were approached:
  - ☐ in a way that they prefer
  - ☐ with information that addresses their needs
  - ☐ with how they will benefit from the association
  - ☐ with a range of options and suggestions of potential content that could be provided
- ☐ When you are the influencer, offers to partner are evaluated against
  - ☐ a set of organization-specific guidelines that consider goals, values, equity of outcomes, and reputation
  - ☐ the ability to reach your audience first with credible information
- ☐ Partnerships are evaluated for
  - ☐ expanded reach
  - ☐ ease of partnership
  - ☐ protection of information, personal assets, and reputation
- ☐ Partnerships are ended when appropriate in a way that maintains reputation and potential for the future.

REFERENCES

CDC (U.S. Centers for Disease Control and Prevention). 2009. "'Priceless' Collaboration for Hurricane Preparedness: Florida's Department of Community Affairs and Its Experience with MasterCard®." *The Risk Communicator*, (2), 4–5.

Cibulsky, S.M., M.A. Kirk, J.S. Ignacio, A.D. Leary, and M.D. Schwartz. 2014. *Patient Decontamination in a Mass Chemical Exposure Incident: National Planning Guidance for Communities*. U.S. Department of Homeland Security, U.S. Department of Health and Human Services, Washington, DC. https://www.dhs.gov/sites/default/files/publications/Patient%20Decon%20National%20Planning%20Guidance_Final_December%202014.pdf (accessed August 24, 2017).

European Centre for Disease Prevention and Control. 2016. *Social Media Strategy Development: A Guide to Using Social Media for Public Health Communication*. European Centre for Disease Prevention and Control, Stockholm. https://ecdc.europa.eu/sites/portal/files/media/en/publications/Publications/social-media-strategy-guide-for-public-health-communication.pdf (accessed August 23, 2017).

European Food Safety Authority. 2016a. "Chile and EFSA Enhance Cooperation in Risk Assessment." European Food Safety Authority. https://www.efsa.europa.eu/en/press/news/161018-0 (accessed October 26, 2017).

European Food Safety Authority. 2016b. "ESFA to Deepen Ties to China." European Food Safety Authority. https://www.efsa.europa.eu/en/press/news/161013a (accessed October 26, 2017).

Geckle, L. and V. Dunbar. 2014. "The Role of Partnerships in Health Risk Communication." Defense Video Imagery Distribution System. https://www.dvidshub.net/news/118750/role-partnerships-health-risk-communication (accessed July 11, 2017).

Giahyue, J.H. and E. Farge. 2015. "Watch Closely and Explain Frequently: Liberia's Ebola Lessons." Reuters. http://www.reuters.com/article/health-ebola-liberia-idUSL5N0WF2GR20150313 (accessed July 14, 2017).

Molteni, M. 2017. "Social Media Influencers Finally Come to . . . Medicine." Wired. https://www.wired.com/2017/03/social-media-influencers-finally-come-medicine/ (accessed August 25, 2017).

NOAA (National Oceanic and Atmospheric Administration). 2016. *Risk Communication and Behavior: Best Practices and Research Findings*. National Oceanic and Atmospheric Administration, Washington, DC.

Peters, R.G., V.T. Covello, and D.B. McCallum. 1997. "The Determinants of Trust and Credibility in Environmental Risk Communication: An Empirical Study." *Risk Analysis*, 17 (1), 43–54.

Reynolds, B. and M. Seeger. 2014. *Crisis and Emergency Risk Communication*, 2014 edition. https://emergency.cdc.gov/cerc/index.asp (accessed July 24, 2017).

U.S. Department of Health and Human Services, Centers for Disease Control and Prevention. 2014. CERC: Stakeholder and Partner Communication. https://emergency.cdc.gov/cerc/ppt/CERC_Stakeholder%20and%20Partner%20Communication.pdf (accessed September 4, 2017).

WHO (World Health Organization) Regional Office for Africa. 2017. "Reaching Key Populations to Prevent the Spread of Disease in Ethiopia." http://www.afro.who.int/

news/reaching-key-populations-prevent-spread-disease-ethiopia (accessed August 24, 2017).

ADDITIONAL RESOURCES

Asia-Europe Foundation. 2013. *Recommendations on Effective Risk Communication for Public Health Emergencies and the Role of Social Media*. Asia-Europe Foundation, Singapore. https://www.asef.org/images/docs/Recommendations%20on%20Effective%20Risk%20Communication.pdf (accessed August 23, 2017).

Crowe, A. 2012. *Disasters 2.0: The Application of Social Media Systems for Modern Emergency Management*. CRC Press, Boca Raton, Florida.

Farag, H., B. Loskota, and R. Flory. 2012. *Faithful Action: Working with Religious Groups in Disaster Planning, Response, and Recovery*. Center for Religion and Civic Culture, University of Southern California, Los Angeles.

Rowell, R., P. Sheikhattari, T.M. Barber, and M. Evans-Holland. 2009. *A Guide to Enhance Grassroots Risk Communication Among Low-Income Populations*. Morgan State School of Community Health and Policy, Baltimore, Maryland. http://serve.mt.gov/wp-content/uploads/2010/10/A-Guide-to-Enhance-Risk-Communication-Among-Low-Income-Populations.pdf (accessed August 20, 2017).

IV

EVALUATING RISK COMMUNICATION EFFORTS

Every risk communication effort can benefit from being evaluated. Evaluation can help a current effort achieve its purpose and objectives and make future efforts more successful.

> From a public health perspective, one should be no more willing to expose the public to an untested message than to an untested drug.
> —Baruch Fischhoff (1989, p. 115)

Risk Communication: A Handbook for Communicating Environmental, Safety, and Health Risks, Sixth Edition. Regina E. Lundgren and Andrea H. McMakin.

© 2018 The Institute of Electrical and Electronics Engineers, Inc., and Regina E. Lundgren and Andrea H. McMakin. Published 2018 by John Wiley & Sons, Inc.

21

EVALUATION OF RISK COMMUNICATION EFFORTS

Every risk communication effort should undergo some sort of evaluation. Whenever possible, evaluations should be conducted during as well as at the end of a project; the former tells you the changes to be made to reach your objectives; the latter tells you what you should change in future efforts. Evaluation can also be conducted in the middle of an effort to provide midcourse corrections. However, the thoroughness and timing of the evaluation will depend on your objectives and purpose (for example, evaluation of crisis communication may have to wait until the worst is over), funding and resources, and organizational constraints.

WHY EVALUATE RISK COMMUNICATION EFFORTS?

Evaluating risk communication efforts takes time and resources. Given the fact that both are limited for many risk communication efforts, why should you bother with evaluation?

Risk Communication: A Handbook for Communicating Environmental, Safety, and Health Risks, Sixth Edition. Regina E. Lundgren and Andrea H. McMakin.

© 2018 The Institute of Electrical and Electronics Engineers, Inc., and Regina E. Lundgren and Andrea H. McMakin. Published 2018 by John Wiley & Sons, Inc.

> Because few risk managers really want to be shown how badly they are doing, evaluations are often more readily conducted to illustrate good performance than in situations where the results will highlight intractable problems.
> —Peter Bennett and Sir Kenneth Calman (1999, p. 257)

Information from the evaluation can be used to refine risk communication policies, procedures, and practices. Most organizations involved in risk communication efforts communicate risk more than once. Information gained from one effort can be applied to strengthen future efforts.

Evaluation can also serve to prove that laws are being followed. As noted in Chapter 3, many risk communication efforts are in some way responses to a law or regulation. Showing a regulatory agency that you have evaluated your efforts can help to prove that you are complying with both the letter and the spirit of the law.

In addition, evaluation can serve to prove to your organization's management that risk communication efforts are valuable. If results show that efforts have met organizational goals, management will be more likely to continue funding. If, on the other hand, the results show that efforts have failed to communicate risk, the information gained in the evaluation should identify where improvements are needed.

Carnegie-Mellon researcher Granger Morgan and his colleagues offer several arguments for using the mental models approach to risk communication (see Chapter 2 for more information), but these arguments could easily apply to any risk communication evaluation effort:

1. "You'd never design a new product on the basis of an engineer's best guess. You'd insist on careful empirical design and testing. The same standard should apply to risk communication."
2. "Why balk at spending an amount of money on getting the message right that is a tiny fraction of the stakes riding on correct public understanding?"
3. "We wouldn't release a new drug without adequate testing. Considering the potential health (and economic) consequences of misunderstanding risks, we should be equally loath to release a new risk communication without knowing its impact" (Morgan et al. 2002, p. 180).

THE MEANING OF SUCCESS

In recent years, evaluations have come under fire as not yielding enough information to improve risk communication activities. Although crafting the evaluation is critically important to its success, certain factors about the risk communication effort make that effort easier to evaluate. Edwin Zedlewski, previously the Acting Deputy Assistant Director for Research and Evaluation for the U.S. National Institute of Justice, helped develop the Evaluability Assessment as a way to identify programs that are likely to yield evaluations that maximize the organization's return on investment. By adopting this approach, organizations at all levels can save considerable time and money.

The approach starts by determining which programs can sustain a rigorous outcome evaluation. The determination takes 1–5 days and is guided by questions such as the following:

- Are program components stable as opposed to still evolving?
- Can logical and plausible connections be traced between a program's activities and its intended outcomes?
- Are there enough cases or observations to permit statistically robust conclusions?
- Can the program's effects be isolated from other related forces operating in the community?

If answers to all four questions are yes, then the risk communication program may be a good candidate for a thorough evaluation (Zedlewski 2006).

The question remains, however, as to how a risk communication program measures its activities. How can you tell whether risk communication efforts have been successful? Success for risk communication efforts relates back to your risk communication plan: Did you meet your objectives? Assuming that you chose the right objectives to begin with, if you met those objectives, you succeeded.

Additional evaluation factors will give you useful information to refine future risk communication efforts, particularly when using the methods of information materials, face-to-face communication, visual representation of risk, mass media, and technology-assisted applications.

David Dozier and colleagues at the University of Maryland, who studied excellence in communications and public relations programs, suggest that, at a minimum, evaluation should measure awareness, knowledge, opinions, and behaviors of the target audience before and after the risk communication program was implemented (Dozier et al. 1995). They also encourage the evaluation of outcomes, not process.

Risk communication experts Weinstein and Sandman (1993) recommend that the following be considered to measure the success of risk communication efforts:

- Does the audience understand the content of the communication?
- Does the audience agree with the recommendation or interpretation contained in the message?
- Do people facing a higher level of the risk perceive the risk as greater or show a greater readiness to take action than people exposed to a lower level of the risk?
- Do audience members facing the same level of risk tend to have the same responses to this risk?
- Does the audience find the message helpful, accurate, and clear?

When it comes to technology-assisted communication, some measurements include presence, influence, and audience reach. Other measurements of social media that are applicable to care communication, suggested by practitioner Craig Lefebvre, include the following:

> Success for risk communication efforts relates back to your risk communication plan: Did you meet your objectives? If you met your objectives, you succeeded.

- **Education.** Are you educating people about issues and problems that are relevant to them?
- **Engagement.** Are you engaging people in positive and meaningful ways?
- **Entertainment.** Is there an entertainment value to your offerings?
- **Empowerment.** Do people believe and feel empowered as a result of their experiences with your programs and services?
- **"Evangelism."** Do you take advantage of opportunities to let your customers and audiences become advocates of your programs in their discussions with others?

For stakeholder participation methods, another set of factors must be considered. Early work at Tufts University suggested the following factors (Rosenbaum 1978):

- **Accessibility.** Did the risk communication effort increase the audience's opportunities to obtain relevant information, air views before decision makers, and hold officials accountable?
- **Fairness.** Were all views given equal consideration in the decision-making process?
- **Responsiveness.** Did the risk communication effort foster recognition of public views on decisions?

More recent work suggests that evaluating stakeholder involvement efforts may be far more difficult. What appears to be success from one side may be abject failure from the other. For example, if litigation was avoided, some organizations may mark the effort as a success, whereas stakeholders leave the tables feeling disenfranchised and still in the dark as to the risks they face. For example, risk communication luminaries Susan Santos of Focus Group and Caron Chess of Rutgers University used two different approaches to evaluate citizen boards advising the Department of Defense on environmental cleanup issues. The more theoretical approach, which considered some of the issues addressed earlier in this chapter (such as fairness), would have ranked the efforts rather low, whereas, using stakeholder perceptions, the efforts were deemed successful from both a process and an outcome point of view (Santos and Chess 2003).

Other factors to consider depend on your particular situation, including resources, organizational requirements, and audience needs. Did you accomplish

Table 21.1. Evaluation Factors to Consider for Care, Consensus, and Crisis Communication

Care communication	Consensus communication	Crisis communication
Did the audience change to less risky behavior?	Were all segments of the audience represented in building the consensus?	Have all members of the audience been alerted to the risk?
How long did the behavior change last?	Does the audience understand enough about the risk to make decisions?	Does the audience understand enough about the risk to make decisions?
Have all members of the audience been alerted to the risk?	Was a consensus reached about the decision?	Did the audience change to less risky behavior?
Does the audience understand the risk well enough to make decisions?	Can the decision be implemented?	Was consistent information given regarding the risk?

the most with the funding and resources available? Would a significant change have been made with additional funding or more staff? Did the fact that all materials had to be approved by seven layers of management delay production or lessen the organization's credibility with the audience? Did a recent election affect the way your audience views a particular risk, and should you have predicted that and planned for it? Table 21.1 lists possible additional factors for care, consensus, and crisis communication.

TYPES OF EVALUATIONS

Once you have decided to evaluate the risk communication effort, you must determine what type of evaluation you need. Kasperson and Palmlund (1989) developed a set of factors to consider when determining how to evaluate risk communication efforts, including the objectives of the evaluation, the choice of evaluators, timing, training and monitoring of evaluators, how the audience is to be involved, boundaries of the evaluation, and how success is measured.

First, determine the objectives of the evaluation effort. Why are you conducting the evaluation? Possible reasons include determining how the current effort is going so that you can revise it, determining what to improve in future efforts, demonstrating to management the results of your program, and proving compliance with regulations. These reasons apply to care, consensus, and crisis communication.

Another factor is who conducts the evaluation. Who will evaluate your efforts? Possible evaluators include those involved in the risk communication

Table 21.2. Advantages and Disadvantages of Using Various Evaluators

Evaluator	Advantages	Disadvantages
Risk communication staff	Staff intimate with program and risk communication practices; approvals generally not needed; staff trusted by organization	May lack credibility with regulating agencies or audience; may have difficulty being objective
Upper management	Positive interactions can increase support; less costly than outside evaluations; staff intimate with organization's constraints	Negative interactions can decrease support; may lack credibility with regulatory agencies or audience
Outside organization	Staff intimate with risk communication practices; may have more credibility with regulators and audience; may be more objective	May be more costly than in-house evaluations; may not understand organization's constraints
Audience	Interactions can increase support; audience understands own needs best; highly credible to audience	May be difficult to get approvals; does not understand organization's constraints or risk communication practices

efforts, upper management, an outside organization that specializes in such evaluations, and your audience. Which you choose will depend on organizational requirements and the situation. Table 21.2 lists the advantages and disadvantages of these evaluators.

Another factor to consider is timing. When should the evaluation be conducted to best get the information you want? Choices include before the effort begins (that is, evaluating the plan), during the effort, and after the effort. Evaluations conducted during the effort should be timed so that there has been enough activity conducted to provide the information needed and so that no activity will be compromised by rescheduling staff time and resources for the evaluation. Evaluations conducted after the effort should generally be conducted soon enough so that facts are still clear in people's minds. Evaluations may be conducted later if retention of information is a factor to be evaluated.

Training of evaluators should also be considered. Do the evaluators know what to look for, and are they capable of getting the kind of information you need? If you are using inexperienced evaluators, have someone experienced in risk communication programs train them in what to look for and how to go about it. Even if you are using experienced evaluators, you will need to acquaint them with your situation. One project manager with whom we worked always had his risk communication messages evaluated by a team of technical experts to make sure that the technical information was correct. With them, he also sent descriptions of the laws he was trying to comply with, his expected audience, and other background information along with the message so that the evaluators could judge the effort in context. He found that this helped to eliminate suggestions and comments that were unreasonable given his situation.

You will also want to monitor the work of the evaluators to ensure that they are collecting their information without hindering your efforts and that you receive their input in time to use it.

Another consideration is how the audience is to be involved. How and when should the audience be involved in the evaluation effort? The audience can be involved in several ways. They can serve as the evaluators themselves, particularly if you have an interactive advisory committee or focus group. They can also serve as the research subjects of a questionnaire or survey.

Also consider the boundaries of the evaluation. Boundaries to consider are access to proprietary data (especially if an outside group will be conducting the evaluation) and access to the audience. Organizational requirements should be considered. Setting a time limit for the evaluation may also be necessary.

Who will evaluate your efforts? Possible evaluators include those involved in the risk communication efforts, upper management, an outside organization that specializes in such evaluations, and your audience.

The final factor to consider is how the success of the risk communication effort should be judged. How will the evaluators determine whether your efforts have been successful? As noted earlier in this chapter, they should evaluate your efforts based on your plan. Did you meet your objectives? If they are evaluating the plan itself, they should evaluate it relative to your reasoning for its content.

Based on these factors and your ultimate purpose and objectives, you can design an evaluation effort that will bring you the information you need.

CONDUCTING THE EVALUATION

Little literature has been devoted to evaluation in risk communication as opposed to other aspects of the field (examples include Kasperson and Palmlund 1989; Regan and Desvousges 1990; Santos and Chess 2003; and Weinstein and Sandman 1993). However, Julie Downs, Carnegie-Mellon University, recommends three types of evaluation for what we call care communication (Fischhoff et al. 2011). The first, formative evaluation, is part of the planning process. During this stage, communicators conduct research to understand the target audiences and how they view the risk. Focus groups (discussed in this book's Chapter 17), interviews (Chapter 15), and the mental models approach (Chapter 9) are useful tools in this stage. This firm understanding of the audiences and their likely responses form the basis for the communication plan and information materials.

The second type of evaluation is a process evaluation, meaning assessing how well the risk communication program is carried out, ensuring that each step has maximum impact. This approach is particularly important when many people are involved in carrying out the plan so that its implementation is as consistent as possible. A process evaluation can help explain why a communication effort had the effects that it did, and let others know what to expect if they follow a similar strategy.

The third type of evaluation is assessing the outcome—the extent to which the communication effort achieved your purposes and objectives. Because your purposes and objectives will most likely involve how your audience will react to your efforts (changing behavior, gaining awareness), your evaluators must consider your audience's reactions to determine whether your efforts have been successful.

> Because your purposes and objectives will most likely involve how your audience will react to your efforts, your evaluators must consider your audience's reactions to determine whether your efforts have been successful.

The best ways to determine audience reactions are surveys and interviews.

Surveys may be conducted online, by mail, phone, electronic mail, or in person, depending on the situation. Consider your resources and the availability and disposition of your audience. For example, David Chrislip and Carl Larson, in their research that led to their 1994 book, *Collaborative Leadership: How Citizens and Civic Leaders Can Make a Difference*, developed a measurement device that could be used for consensus communication activities. The survey, which covers five dimensions (context of the effort, design of the effort, stakeholder skills and attitudes, consensus process, and results), asks respondents to mark statements as true, more true than false, more false than true, or false. The instrument has been shown to accurately correlate with success of the effort, as judged by comparisons with results of other instruments (Chrislip and Larson 1994).

Interviews can be conducted separately with representative members of your audience or in focus groups. Occasionally, however, time or organizational constraints make it impossible to use surveys or interviews. For example, some government organizations must receive permission from the federal Office of Management and Budget before conducting any survey of more than 10 people. Alternative methods to evaluate audience reactions to risk communication efforts include the following:

- **Reviewing risk communication plans.** Evaluators can look at your plan and evaluate it against the audience's, organizational, and regulatory requirements. For example, regulators often evaluate an organization's community relations plan for Superfund sites to ensure that the community will be kept informed of and involved in activities.
- **Reviewing specific messages for content.** If the evaluators are sufficiently schooled in the theories, principles, and practices of risk communication,

they may be able to point to problems by reviewing the information you are disseminating. For example, J. Harrison Carpenter of Michigan Technological University found that the way technical terms are defined in text can result in potential manipulation of the content (either to paint too rosy a picture or to create fear). He goes on to present a possible tool for classifying terms and their definitions that might be used to test risk communication messages to ensure appropriate presentation of information (Carpenter 1997).

- **Reviewing entire efforts for such factors as continuity of content, timing, and follow-through.** How the risk is communicated is often as important as the content of the risk messages themselves. Evaluators may be able to determine patterns that should be changed or maintained. For example, evaluators might review the timing, scope, and content of health care campaign messages to ensure appropriate coverage across time and audiences.

Researchers for the U.S. Nuclear Regulatory Commission offer three low-cost ways to evaluate efforts: (1) reading the local newspaper to see if coverage matches key messages and facts, (2) having a colleague observe interactions with the audience and see how the audience responds, and (3) asking the audience for feedback at the end of meetings (Persensky et al. 2004).

Regardless of which technique is employed, evaluations are generally conducted in a similar manner. Michael Regan and William Desvousges (1990), in their risk communication evaluation handbook for the U.S. Environmental Protection Agency, suggest five steps to this evaluation process:

1. **Clarify the risk communication goals and objectives.** You must know what you are trying to accomplish before you can evaluate how well you did it. See Chapter 7 for additional information on setting the purpose and objectives.
2. **Determine information needs for evaluation.** What kinds of information will you need to prove that you are meeting your objectives? For example, if your objective is to raise awareness of an issue, you might want to conduct a survey at the beginning of your risk communication effort to understand the current level of awareness among your intended audience. After conducting the risk communication effort, you would do another survey to see how awareness had changed.
3. **Collect the information.** As part of your risk communication effort, you would gather the information you had identified as needed for evaluation purposes.
4. **Analyze the data.** You would then look at the information you had gathered to identify any trends or difficulties.
5. **Draw conclusions.** You would determine what might be changed to enhance any positive trends or to resolve any difficulties.

They further suggest that this activity be included in the original risk communication plan to ensure that timing, resources, and information gathered are appropriate.

See Chapter 19 for information on evaluating social media efforts, and see Chapter 24 for evaluating public health campaigns.

CHECKLIST FOR EVALUATING RISK COMMUNICATION EFFORTS

☐ What constitutes success in the risk communication effort has been determined.

The following were determined before the evaluation:

☐ Evaluation objectives
☐ Evaluators
☐ Timing
☐ Training of evaluators
☐ Monitoring of evaluators
☐ Audience involvement
☐ Possible boundaries
☐ Judgment of success

My purpose in evaluation is:

☐ Refining practices
☐ Determining whether efforts should continue
☐ Proving compliance with the law

To evaluate the risk communication efforts, evaluators will:

☐ Conduct audience interviews
☐ Survey the audience
☐ Review risk communication plans
☐ Review specific messages for content
☐ Review the effort for continuity of content, timing, and follow-through
Evaluators will follow this process for the evaluation:
☐ Clarify the risk communication goals and objectives
☐ Determine information needs for evaluation
☐ Collect the information
☐ Analyze the data
☐ Draw conclusions
☐ Share results with the risk communication team

REFERENCES

Bennett, P. and K. Calman. 1999. *Risk Communication and Public Health*. Oxford University Press, New York.

Carpenter, J.H. 1997. "Define and Conquer: Technical Definitions and the Rhetoric of Risk Communication." *Proceedings of the Fourth Biennial Conference on Communication and Environment, State University of New York-Syracuse, New York.*

Chrislip, D.D. and C.E. Larson. 1994. *Collaborative Leadership: How Citizens and Civic Leaders Can Make a Difference*. Jossey-Bass, San Francisco, California.

Dozier, D.M., L.A. Grunig, and J.E. Grunig. 1995. *Manager's Guide to Excellence in Public Relations and Communication Management*. Lawrence Erlbaum Associates, Mahwah, New Jersey.

Fischhoff, B. 1989. "Helping the Public Make Health Risk Decisions." V.T. Covello, D.B. McCallum, and M.T. Pavlova, eds., *Effective Risk Communication: The Role and Responsibility of Government and Nongovernment Organizations*. Plenum Press, New York, pp. 111–116.

Fischhoff, B., N.T. Brewer, and J.S. Downs, eds. 2011. "Evaluation." *Communicating Risks and Benefits: An Evidence-Based User's Guide*. U.S. Department of Health and Human Services, Food and Drug Administration, Washington, DC.

Kasperson, R.E. and I. Palmlund. 1989. "Evaluating Risk Communications." V.T. Covello, D.B. McCallum, and M.T. Pavlova, eds., *Effective Risk Communication: The Role and Responsibility of Government and Nongovernment Organizations*. Plenum Press, New York, pp. 143–158.

Morgan, M.G., B. Fischhoff, A. Bostrom, and C.J. Atman. 2002. *Risk Communication: A Mental Models Approach*. Cambridge University Press, New York.

Persensky, J., S. Browde, A. Szabo, L. Peterson, E. Specht, and E. Wright. 2004. *Effective Risk Communication: The Nuclear Regulatory Commission's Guidelines for External Risk Communication*, NUREG/BR-0308. U.S. Nuclear Regulatory Commission, Washington, DC.

Regan, M.J. and W.H. Desvousges. 1990. *Communicating Environmental Risks: A Guide to Practical Evaluations*, EPA 230-01-91-001. U.S. Environmental Protection Agency, Washington, DC.

Rosenbaum, N. 1978. "Evaluating Citizen Involvement Programs." S. Langton, ed., *Citizen Participation Perspectives*. Lincoln Filene Center for Citizenship and Public Affairs, Tufts University, Medford, Massachusetts, pp. 82–86.

Santos, S.L. and C. Chess. 2003. "Evaluating Citizen Advisory Boards: The Importance of Theory and Participant-Based Criteria and Practical Implications." *Risk Analysis*, 23 (2): 269–280.

Weinstein, N.D. and P.M. Sandman. 1993. "Some Criteria for Evaluating Risk Messages." *Risk Analysis*, 13 (1), 103–114.

Zedlewski, E. 2006. "Maximizing Your Evaluation Dollars." *National Institute of Justice Journal*, (254), July.

ADDITIONAL RESOURCES

Council of Canadian Academies. 2015. Health Product Risk Communication: Is the Message Getting Through? Council of Canadian Academies, Ottawa. http://www.scienceadvice.ca/uploads/ENG/AssessmentsPublicationsNewsReleases/RISK/RISKFullReportEn.pdf (accessed September 14, 2017).

Desvousges, W. H. 1991. "Integrating Evaluation: A Seven-Step Process." A. Fisher, M. Pavlova, and V. Covello, eds., *Evaluation and Effective Risk Communications Workshop Proceedings*, EPA/600/9-90/054. U.S. Environmental Protection Agency, Washington, DC, pp. 119–123.

Desvousges, W.H. and V.K. Smith. 1988. "Focus Groups and Risk Communication: The 'Science' of Listening to Data." *Risk Analysis*, 8 (4), 479–484.

Kline, M., C. Chess, and P. Sandman. 1989. *Evaluating Risk Communication Programs: A Catalog of "Quick and Easy" Feedback Methods*. Rutgers University, Cook College, Environmental Communication Research Program, New Brunswick, New Jersey.

Santos, S.L. 1990. "Developing a Risk Communication Strategy." *Management and Operations*, November, 45–49.

Smith, V.K., W.H. Desvousges, A. Fisher, and F.R. Johnson. 1987. *Communicating Radon Risk Effectively: A Mid-Course Evaluation*. U.S. Environmental Protection Agency, Office of Policy Analysis, Washington, DC.

U.S. Army Corps of Engineers, Institute for Water Resources. 2015. Evaluation of Public Involvement in Flood Risk Management Pilot Projects. 2015-CPC-2, Alexandria, Virginia. http://www.iwr.usace.army.mil/Portals/70/docs/cpc/Added%202016/PIFRM%20report%2012.2015.pdf (accessed September 14, 2017).

V

SPECIAL CASES IN RISK COMMUNICATION

> In emergency risk communication, it's your job to provide the public with information that allows them to make the best possible decision within nearly impossible time constraints.
> —Linda Sokler, Managing Regional Director of American Institutes for Research, Prospect Center, 2002

Since the initial publication of this book, certain situations have challenged risk communicators, even beyond the normal challenges of communicating environmental, safety, and health risks to audiences who may be apathetic (in care communication), frustrated (in consensus communication), or fearful (in crisis communication).

Two of the most challenging cases for risk communicators are unexpected emergencies and international communication. The terrorist attacks of September 11, 2001, in the United States, subsequent public health emergencies like Ebola, and rising natural disasters worldwide have shown that emergency risk communication requires different strategies and tactics to be successful. In addition, the globalization of commerce,

---

Risk Communication: A Handbook for Communicating Environmental, Safety, and Health Risks, Sixth Edition. Regina E. Lundgren and Andrea H. McMakin.
© 2018 The Institute of Electrical and Electronics Engineers, Inc., and Regina E. Lundgren and Andrea H. McMakin. Published 2018 by John Wiley & Sons, Inc.

communication, and crises has made it critical that risk communicators understand the international nature of risks and how to communicate across cultures. In addition, public health campaigns, while a mainstay of risk communication efforts, must adapt to both crises and the need to reach international audiences.

22

EMERGENCY RISK COMMUNICATION

This book uses a paradigm that divides risk communication into care, consensus, and crisis communication. That paradigm is based on a number of factors such as agreement on the magnitude of the risk between scientific experts and those at risk, the level and type of involvement by audiences or participants, and the urgency of the risk. In this chapter, we make a distinction between a crisis and an emergency. A traditional definition of a crisis is a turning point that will decisively determine an outcome. Medical practitioners once spoke of a crisis as a critical point in a disease. Thus, a crisis follows a process, even if it is an undesirable one, and is not altogether unexpected.

An emergency, on the other hand, has traditionally been defined as a sudden or unforeseen situation that requires immediate action. Emergencies are random, they often do not follow predictable processes, and they are unexpected. By these definitions, the sudden rupture of an underground oil tank that has been leaking for some time would be a crisis, whereas a bioterrorist attack would be an emergency. Other recent examples of emergencies include disease outbreaks (pandemic flu, botulism, Ebola, and Zika viruses), natural disasters, and terrorism-related events.

Risk Communication: A Handbook for Communicating Environmental, Safety, and Health Risks,
Sixth Edition. Regina E. Lundgren and Andrea H. McMakin.
© 2018 The Institute of Electrical and Electronics Engineers, Inc., and Regina E. Lundgren
and Andrea H. McMakin. Published 2018 by John Wiley & Sons, Inc.

A crisis follows a process. An emergency is a sudden or unforeseen situation that requires immediate action. The sudden rupture of an underground oil tank that has been leaking would be a crisis, whereas a bioterrorist attack would be an emergency.

Risk communicators have long dealt with crises such as industrial accidents (hazardous releases internal to a facility, environmental releases) and routine disease outbreaks (flu seasons, measles). Indeed, crisis communication, as our paradigm implies, is a distinct branch of risk communication, with its own strategies and tactics. What is different about risk communication in an emergency? At times, communication principles, strategies, and tactics in emergencies fit within the boundaries of crisis, care, and even consensus communication. Nevertheless, those communicating risk must understand the unique characteristics of emergency risk communication so they can plan for the unexpected and communicate during and after an emergency.

UNDERSTANDING EMERGENCY RISK COMMUNICATION

Emergencies have their own unique characteristics that affect how risk communication is put into practice. Table 22.1 shows some of these characteristics. The following text explains these characteristics in more detail.

Emotions and Public Actions

People's reactions during an emergency can be intense and complex. Fear may prompt a debilitating response, with people acting in extreme and sometimes irrational ways to avoid a perceived or real threat. Although research shows that in some natural disasters people draw together and ordinary folks become heroes, some emergencies like bioterrorism attacks may engender more panicked responses because the agent is unseen and at first unknown. For example, after the sarin attacks in the Tokyo subway, thousands of worried people who thought that they might be affected overwhelmed the medical system for a short time (Green et al. 2007).

On the other hand, people may feel apathy or hopelessness, that nothing they do will help. They may experience denial, leading to avoiding warnings, not believing the threat is real, or not believing it applies to them. Psychological factors associated with hurricane warnings are a good example (Revkin 2011). Some people ignore mandatory evacuation orders because they feel that staying to protect their property and belongings is more important than any personal harm they may suffer. Those who have lived through previous hurricanes may have a false sense of familiarity that leads to taking new warnings less seriously: "I've lived through these before." And others have a false sense of control—the feeling that they can get out safely if conditions become dangerous, sandbag their house

Table 22.1. Characteristics of Emergency Risk Communication

What is different	The result	Practices
Purpose	Communicators must explain, put in context, correct misperceptions, give options for action, empower people to make decisions, move people to recovery, and help them attain a new level of readiness	Use principles of care and crisis communication as appropriate
Sense of urgency, rapid rate of change	Decisions must be made within a narrow time frame, with an uncertain outcome, to reduce risks that are still unknown and to rapidly recover from an event that is still unfolding	Recognize that communication may be confusing, contradictory, and subject to change as the event evolves. Preplanning can reduce confusion
Disrupted logistics	Normal or preplanned communication channels and actions may not be available, such as electrical power, cell phones, Internet connections, and transportation to scenes	Use preplanning and be flexible during the event to identify alternatives
Potential for large numbers of ill or injured people across wide jurisdictions	Lines of authority cross for responders, family and friends demand immediate information, and the health care infrastructure can be severely stressed	Team with a wide variety of agencies and organizations and look for creative communication alternatives
Intense media and social media attention	Reporters and "citizen journalists" are seeking and reporting information nonstop	Designate and train spokespeople, but prepare others to speak and share content as well
Emotional response	People may experience a range of strong emotions including fear, anger, panic, denial, laying blame, solidarity with others,	Develop and implement communications that account for these responses, including

(*continued*)

Table 22.1. (*Continued*)

What is different	The result	Practices
	desire to help victims, and need for personal control. All these may affect how people respond to a risk	giving people reasonable and appropriate actions to take
Incomplete or unknown information	Misunderstanding facts about the risk may affect people's response. Uncertainty may increase fear and panic	Address factual misperceptions in planning and during an emergency. Explain what is known at the time and what is unknown, saying that it is preliminary. Say what you are doing to find out more. Concede errors and modify previous statements as more information comes to light
Involvement of multiple organizations, sometimes with competing agendas, including possible documentation for law enforcement investigation	Sources may issue conflicting information, leading to confusion and reduced credibility	Get buy-in of organizations during emergency planning. Understand agency roles, jurisdictions, and preservation of evidence/criminal/regulatory follow-up. Draw clear lines of authority and responsibility, and make sure everyone understands the roles
Security and privacy issues	Some information, such as victims' names, cannot be released	Explain the kind of information that cannot be released and why. Say whether it will be released later and under what circumstances
Backlash	After the emergency is over, people may seek those to blame	Evaluate deficiencies. Take responsibility for things that were your organization's fault. Explain what is being done differently now

against flooding, and so on. Attitudes such as these can result in not taking action until the last minute or until it is too late.

Despite these negative responses, a national survey after the September 11, 2001, attacks in the United States showed that people want honest and accurate information about terror-related situations. They want this information even if it makes them worried, angry, or fearful. They want the facts, want to know whom to blame, and want to feel solidarity with fellow citizens (Fischhoff 2002).

They do not want leaders to hide their own responses to tragedies. Risk communication consultant Peter Sandman likes to use the example of former New York City Mayor Rudy Giuliani. When asked about the number of casualties just hours after the World Trade Center attacks, Giuliani simply answered, "More than we can bear."

> Americans do not want leaders to hide their own response to tragedies. Risk communication consultant Peter Sandman likes to use the example of former New York City Mayor Rudy Giuliani. When asked about the number of casualties just hours after the World Trade Center attacks, Giuliani simply answered, "More than we can bear."

Giuliani's impact in the days that followed resulted not just from his calmness, competence, and compassion, Sandman says, but from the fact that these traits were accompanied by Giuliani's readily detectable pain, which enabled people to identify with him.

Sandman also argues that communicators should not try to "over-reassure," or convince, people that there is nothing to be afraid of. People may rightly be afraid. Instead, acknowledge and accept that the fear is legitimate, then tell people what is being done and what they can do.

This concept of giving people reasonable actions to take is very important in an emergency, especially ones involving public health. You want people to be concerned and vigilant, and to take reasonable precautions. Through actions, people share control of the situation, and, in some cases, they can keep it from getting worse. Having a constructive role engages people in a common mission and provides a sense of control. People can do things to help themselves, victims, and emergency responders. They can also be prepared to do things to minimize the risk of more bad things happening.

Sandman suggests giving people a choice of three actions matched to their level of concern: a minimum precaution, a maximum response, and a recommended middle response. For example, for drinking water safety, a public health official might give three options: use chlorine drops (minimum), buy bottled water (maximum), or boil water for 2 minutes (the recommended middle response). Another way of looking at this is: you must do X, you should do Y, and you can do Z.

> Having a constructive role engages people in a common mission and provides a sense of control.

Case Study: Ebola Offers Lessons Learned

The 2014–2015 outbreak of Ebola, a hemorrhagic fever, infected more than 28,000 people, claimed more than 11,000 lives, and caused global panic. The World Health Organization (WHO) was harshly criticized for its lackadaisical response to the epidemic (Moon et al. 2015). WHO took 9 months to declare a global public health emergency, during which time it ignored and even downplayed warnings from other health agencies and its own experts about the pace at which the virus was spreading across West Africa.

The Centers for Disease Control and Prevention (CDC), which specializes in public health, also came under fire. When the first U.S. resident was diagnosed with Ebola in Dallas, the CDC expressed confidence in the ability of the health infrastructure to deal with an outbreak. CDC experts also initially said that the infection couldn't spread through indirect transmission routes, such as coughing and sneezing, and that it was transmitted only by direct contact with the body or bodily fluids of someone infected.

When two nurses became infected by the Ebola patient in Dallas, the CDC then said that it was possible to transmit the infection from droplets of the virus from about 3 feet away. Suddenly people were wearing respirators on trains and governors were making travel bans based on fear and anxiety.

The criticism was not that the CDC got it wrong, but that the initial guidelines were communicated with certainty, in a way that suggested that Ebola was a well-understood disease. As noted risk communication expert Peter Sandman put it, "When the CDC changed its guidelines, it made the initial recommendations look insufficiently cautious and incompetent. The more officials continue to sound like cheerleaders, ignoring or minimizing what goes wrong, the more the media will focus on knocking them off their high horse" (McKay 2015).

When a second person was diagnosed with Ebola in New York City, that city's Department of Health and Mental Hygiene was more effective in tamping down public fear. Broadly issuing key information and squelching rumors was key. A 10-person social media monitoring team worked around the clock during the scare. The team used social media channels to clarify the confusion between airborne and nonairborne transmission of the infection, and used promoted Facebook posts to spread the message. The team also held Ebola events, informational sessions, and town halls, and used social media to tell people where to attend these meetings.

Recommendations from this experience are to communicate risks early, explain the uncertainty surrounding the risk, and continuing updating the nature of the risk as more information becomes known. For epidemics, use a whole-community approach, including social media, video, a toll-free number, and involvement by emergency managers—which worked well in countries like Nigeria. Ensure that hospital personnel have the appropriate training before you tell the public that they are safe.

Case Study: Zika Benefits from Lessons Learned

In contrast with communication failures related to the Ebola virus, WHO officials were praised for communicating about the Zika virus epidemic in 2016. Transmitted by mosquitos, Zika began in Brazil and was later linked to the birth deformity known as microcephaly.

The WHO declared a Public Health Emergency of International Concern, a formal and rarely used designation, on February 1, 2016, despite there still being many unknowns at the time. This was just 4 months after the link with microcephaly was first noted—which was the first time anyone realized the disease might cause something worse than rashes and fevers (Rathi 2016).

Most importantly, the WHO's new emergency program included an incident-management system, which helps it work across its own departments and regional partners much more quickly. On February 16, the WHO used this system to launch a comprehensive new report that detailed how the world could fight Zika over the next 6 months.

On March 1, 2016, WHO published an interim guidance publication, "Risk Communication in the Context of Zika Virus," for health authorities, health communication managers, staff, and volunteers. It identified ways to engage affected and concerned communities, gave an action-based key message ("protect yourself from mosquito bites"), and addressed communicating uncertainties and unknowns, including changing focus as the situation evolved. On March 11, WHO and international partners issued "Risk Communication and Community Engagement for Zika Virus Prevention and Control" in Spanish and English.

The WHO, with other international partners, created, in several languages, an animated video showing how to fight Zika; posters tailored for health workers, the public, and pregnant women; and radio spots.

"The WHO's skillful embrace of uncertainty and the emergency committee's adherence to transparency in accounting for how it reached the decision to recommend a public health emergency declaration, represents a new high standard in risk communication," said Canadian health risk communication expert Joshua Greenberg (Greenberg 2016; Rathi 2016).

Credibility and Trust

> Information is the most valuable commodity during emergencies or disasters and helps in generating visibility and credibility.
> —S.A. Barrantes et al. (2009, p. 12)

The need to establish credibility and trust is a common theme in risk communication. Ideally, trust is built over time and is the result of ongoing actions, listening, and communication skills. In an emergency, it helps if the responding organizations have already built trust in the affected communities. If they have not, or if people have not come in contact with them enough to build trust, there are still things the organization can say and do to build trust in an emergency.

Research has shown that several factors affect trust: caring and empathy, dedication and commitment, competence and expertise, honesty and openness, fiduciary responsibility, confidentiality, and equity (Slovic 1999; Thomas 1998). Trust and credibility are eroded when there is disagreement among experts; lack of coordination among risk management organizations; lack of listening, dialogue, and public participation; an unwillingness to acknowledge risks; not disclosing information in a timely manner; and not fulfilling risk management responsibilities (Chess et al. 1995; Covello et al. 1989).

A number of examples underscore the importance of establishing trust in emergency risk communication. Residents of Flint, Michigan, became outraged when officials delayed communicating about, and then downplayed, the risk of poor water quality. Citizens had been complaining about the water quality since 2014, but some officials were still denying the extent of the problem even when testing showed lead in the water in 2015. The mayor declared a state of emergency in late 2015, followed by then-President Obama doing the same in early 2016. An independent task force primarily blamed the Michigan Department of Environmental Quality for the public health crisis, saying its "response was often one of aggressive dismissal, belittlement, and attempts to discredit these efforts and the individuals involved" (Kennedy 2016). Criminal charges were filed against several officials in 2016 and 2017.

After the 2010 BP oil spill in the Gulf of Mexico, Chief Executive Tony Hayward undermined trust when he stated that underwater oil plumes did not exist, that the environmental impact would likely be very modest, and that sickened cleanup workers were not affected by oil fumes but by some other cause, perhaps food poisoning. He showed an utter lack of empathy when he stated that he wanted his life back, failing to acknowledge the loss of life and livelihood facing those killed in the original well blowout.

Beijing was widely criticized for its initial cover-up of severe acute respiratory syndrome (SARS) cases, which surfaced in southern China in 2002 and killed more than 800 people worldwide before subsiding in 2003. In Hong Kong, which suffered 299 deaths, the health department first learned about the emergency through media reports. To its credit, China has since instituted a 24-hour online monitoring and consultation system to gather information and answer medical questions to prepare for future outbreaks.

Similarly, the British government was criticized about covering up facts in the early stages of the mad cow disease epidemic that began in the 1980s in the United Kingdom. Perhaps learning from that experience, when the disease surfaced in the United States in 2003, government agencies and industry groups immediately began communicating with the public about actions to recall meat, trace the affected cow's history, and ensure the safety of the food supply.

These examples demonstrate that it is important to tell people what you know and what is not known, and to correct misinformation as soon as it is discovered.

> The British government's big mistake, at the time of that [mad cow disease] epidemic, was to cover up facts and hide statistics. Official secrecy led to increased anxiety. The British lesson is clear: If more facts are revealed, consumers will feel safer, and the industry is less likely to suffer permanent damage.
>
> —*The Washington Post*, December 28, 2003

Trust is also affected by who delivers the message. Researchers have found that in emergency risk communication, local officials and emergency responders were more trusted than federal officials (Wray et al. 2006). State or federal government agencies should involve these groups as appropriate during an emergency.

Individual trust still overrides organizational trust. Research has shown that direct personal contact has the most significant effect on a person's willingness to trust and act on health-related information (Covello et al. 2001). Throughout the duration of the Washington, DC, anthrax case, a CDC Epidemiologic Investigation Service officer met repeatedly with the Brentwood postal workers to discuss antibiotics. In a public situation, when the officer gave the recommendation of 30 days of antibiotic therapy in addition to the anthrax vaccine, an activist in the crowd started shouting inflammatory comments. But because the officer had established himself as a credible and trusted source of information, instead of rallying around the activist, the crowd told him to be quiet so they could hear what the officer had to say.

> Individual trust overrides organizational trust.

Community trust can be increased if authorities have displayed competency, fairness, empathy, honesty, and openness before a disaster (Cordasco et al. 2007). For example, public health and emergency response officials charged with planning for disasters should include community representatives, drawn from churches, social clubs, schools, or labor unions, at all levels of disaster planning and response.

Trust is also affected by how an organization responds to a diverse community. In 2005, more than 100,000 New Orleans residents failed to evacuate before Hurricane Katrina's landfall, despite mandatory evacuation orders. Research showed that distrust of authorities played a strong role among those who did not evacuate, especially among poor and minority groups (Cordasco et al. 2007). Some people, in fact, believed that the authorities purposely diverted water into poorer neighborhoods to save the wealthier ones.

During the 1999 West Nile virus outbreak, New York City officials commendably issued brochures and fact sheets in at least 10 languages. However, trust was diminished when communications were neglected for sensitive populations, such as alerting asthmatics about spraying locations and schedules (Covello et al. 2001).

PLANNING FOR THE UNEXPECTED

Planning involves understanding the needs and desires of the community and organizational jurisdictions in an emergency situation, creating and getting approval for a written plan, training staff, educating the public, getting the resources required in the plan, and making sure that the infrastructure is in place to carry it out. Planning should be done with the help of stakeholders and partners, including citizens, who could be affected by or will respond to an emergency, as well as those who will implement the plan. The following subsections provide guidance on making sure that your organization is ready, teaming with other organizations, working with communities in advance, determining appropriate communication methods, and developing an emergency communication plan.

Preparing Your Organization

Many organizations are expected to play a role in responding to emergencies. In the public sector, state and local emergency response units stand ready to save lives and bolster damaged infrastructure. In the private sector, organizations provide needed volunteers and donations of critical goods and services. Although effective response requires the teamwork of many organizations, each one understands its niche in the process. It is the same in risk communication.

Preparing your organization to effectively communicate risk during an emergency takes time and effort. Some of the most critical preparations, however, have to do with attitude and process rather than simply gathering communication tools. What often hinders communication in emergencies is not the lack of infrastructure or skills but the lack of consensus on roles and responsibilities. Also important is making sure that the organization's own employees receive and share information during an emergency.

Check Your Attitudes at the Door

Organizations charged with communicating risk during an emergency must first take inventory of their attitudes and processes. Chapter 4 discusses ways to combat such nonproductive attitudes as malicious compliance with regulations, a pessimistic attitude toward the public, an unwillingness to share power, and management apathy or hostility. That chapter also describes how to overcome ineffective organizational processes such as inappropriate resources, inappropriate review and approval procedures, conflicting organizational requirements, and access to staff and information. Although such difficulties can limit any type of risk communication endeavor, they become magnified when trying to deal with an emergency. It is best to deal with them when calm heads are more likely to prevail.

Organizations also must deal with ethical issues well before an emergency occurs. Chapter 5 deals with such issues as determining those who are potentially at risk, the acceptable magnitude of a risk, representation of those at risk, and the use of persuasion. Each organization will likely respond differently to such issues, but working with teaming agencies to come to consensus on how these issues will be addressed in an emergency is also critical when communicating with the news media and the public during an emergency.

You Want Me to Do What? Determining Staff Roles

Because of the extensive teamwork necessary to respond to an emergency, organizations also need to be clear internally as well as externally about their roles. Are you the first responder on the scene gathering information about the depth and breadth of the situation for other team members to communicate, while at the same time working to minimize panic and maximize appropriate responses by the public? Does your organization gather information from all sources, distill it, and provide a cohesive message so that team members can speak with one voice? Are you the spokesperson, interfacing with the news media, social media, and the public? Do you provide support with staff or equipment and, thus, communicate needs and capabilities to those making decisions?

All staff likely to be involved in an emergency response need to understand the organization's role in the risk communication process, and all organizations expected to work together on a response need to understand and agree on each other's roles.

All organizations expected to work together on a response need to understand and agree on each other's roles.

Staff within an organization also need to understand their roles within the wider organizational mandate. Who is the contact person for the organization? Who serves as spokesperson? Who analyzes risks and responses? Who ensures communication within the organization? Some government organizations have designated mission-essential functions—those activities that must be maintained should a catastrophic disaster hinder normal functioning. What are your organization's mission-essential functions and which employees will be expected to staff them? How will they communicate with each other, with other members of the organization, with partner organizations, and with the news media?

Table 22.2 shows how typical organizational roles fit within the emergency risk communication process. Note that the roles are patterned after the incident command structure used by many emergency management organizations across the United States. Although titles in some areas may vary, functions should be analogous.

Ensuring Worker Communication

In a wide-scale emergency such as a terrorist attack or disease outbreak, organization staff are as likely to be affected as the public. Even for staff not directly affected or involved in the response effort, the loss of infrastructure such as phone lines may prevent information from reaching them in traditional ways. In addition, emergency communication plans often direct

Before an emergency, staff members need to know how information is going to reach them and where to go for additional information.

Table 22.2. Typical Staff Roles in the Emergency Risk Communication Process

Role in emergency	Role in emergency response risk communication	Example activities
Incident commander—manages the response	Ultimate authority on response, manager of the public information officer	• Holds hourly to daily briefings with response leaders, including public information officer • Shares information with public information officer • Reviews and approves information to be released
Safety officer—ensures that responders have adequate protection	Subject-matter expert, providing information on safety (precautions, limitations, etc.)	• Initially briefs public information officer followed by additional briefings as the situation evolves
Public information officer—ensures public, news media, and social media have appropriate information	Spokesperson or coach of spokesperson, conduit of information	• Attends briefings with various command staff • Monitors public and media information needs • Suggests data that should be gathered for planning and intelligence functions • Crafts messages to public and media • Serves as or coaches spokesperson • Responds to public and media information requests
Agency liaison—ensures cooperation with appropriate organizations	Subject matter expert, providing information on own agency's support to the effort (number of staff, roles, etc.)	• Initially briefs public information officer followed by additional briefings as the situation evolves

Agency representative—manages agency's portion of response	Subject matter expert, providing information on agency's role, and sharing response information with own agency; may also serve as agency spokesperson	• Responds to questions from public information officer as requested • May serve as agency spokesperson
Planning and intelligence—collects and analyzes information and recommends actions	Data gathering and sharing with response team, including public information officer	• Gathers communication information as well as other emergency information • Briefs public information officer on regular basis
Logistics—provides support, necessary infrastructure, and supplies	Providing necessary equipment for communication internally and externally	• Understands communication needs • Supplies equipment, infrastructure, and other items necessary for communication
Finance/administration—manages costs, payment, and procurement	Collecting and paying costs of communication	• Accrues costs • Pays bills

communications externally to the news media and public—and not internally to staff and management. Thus, organizations need to consider how to get information to staff during an emergency.

Workers generally have several broad information needs in an emergency. They need to know what is expected of them from a work perspective. If the emergency occurs during off-hours, do they come in as usual, come in on different shifts, report to a different location, or shelter in place? If the emergency happens while they are at work, do they evacuate the building, move to an emergency shelter, or return home?

During an actual emergency, staff members need to know the same things the general public wants to know, including the depth and breadth of the emergency, what is being done to respond, and what they can do to help. Before an emergency, however, staff members need to know how emergency information is going to reach them and where to go for additional information. Some organizations make emergency communication the responsibility of the communications staff, but this can prove problematic if communication staff are also serving as the public information officers in an emergency. The information officer must look outward, to other organizations, to the news media, to social media, and to the public. This outward focus and the time commitment associated with it make reaching staff difficult. It is better to make organizational communication the responsibility of another function, such as human resources.

To ensure that staff know their roles in an emergency, they must be trained and their training reinforced. Risk assessment and risk communication researchers who gathered in Israel to consider how to respond to terrorism-related emergencies (Green et al. 2007) suggested that organizations should think through the actions expected for staff. For example, if the staff may be exposed to radiation, how far must they undress to be decontaminated? Will they need something to protect their modesty? If all their belongings, including car keys and cell phones, are confiscated for decontamination, how will they get home?

Emergencies happen too rarely for people to remember how to respond without frequent reminders. Some organizations that use security badges include information on emergency response directly on the badge or on another card worn with the badge. Others issue business-card-size information pieces to be carried in wallets, or small booklets to be kept at home. Other methods employ telephone hotlines, texts, and internal websites for staff only.

Teaming with Other Organizations

Once your organization knows its role in an emergency, it is time to find its role with other responding organizations. It takes a number of functions to adequately respond to an emergency, particularly one of regional or national significance. Health care providers, emergency medical technicians, fire, police, and civic organizations respond at a local level. Most have state- and national-level counterparts. Some emergencies involve private organizations as volunteers or critical equipment donors.

If you have an incident, they will come.
—Health Officer, Palm Beach County, Florida, commenting on people who responded when anthrax was found there

Local organizations sometimes worry that they will have to shoulder the burden alone, but experience with emergency events in recent years has shown that a serious event brings help from expected and not-so-expected places. As the Health Officer of Palm Beach County, Florida, eloquently put it after anthrax surfaced there, “If you have an incident, they will come.” The question is: what are you going to do with this help?

The U.S. Federal Emergency Management Agency suggests organizing responses around emergency support functions (ESFs). Those most closely related to risk communication are ESF 8, which relates to public health, and ESF 15, which relates to external affairs (public information). Teaming organizations need to determine who takes the lead and who supports each function. How are decisions made among teaming organizations? They also need to determine what support entails, how teaming organizations will be notified, and where they will meet to respond. Such details are typically outlined in an emergency response plan, which all organizations should review and approve.

With organizational roles agreed upon, team members need to train internally and with each other. Such training helps find potential pitfalls in the plan before an emergency occurs and helps staff remember their roles. The news media can be included in training to ensure that they are aware of how information will be shared and with whom (Green et al. 2007). Public health agencies that participated in field exercises with physicians and utility owners (water, electricity) found that the key to effective teaming was to repeatedly validate each other’s assumptions. Misunderstandings could then be corrected as soon as they were identified (Parkin et al. 2008).

Note, however, that training is more necessity than luxury. In the aftermath of the New York World Trade Center bombing in 1993 and the Oklahoma City bombing in 1995, a 1998 U.S. Congressional mandate called for practice operations for a terrorist attack. Such exercises are designed to assess the nation’s crisis management capabilities under extreme conditions and to identify areas needing additional training and preparation. In reviewing lessons learned from the 2009 H1N1 pandemic, the Government Accountability Office found that relationships built in interagency exercises were valuable during actual responses (GAO 2011).

For more detail on partnerships, see Chapter 20.

Exercises and Drills

Risk communication is an integral part of exercises and drills that emergency response organizations conduct.

The Federal Emergency Management Agency (FEMA) oversees the National Exercise Program, the U.S. system for emergency preparation drills. The exercises have featured scenarios ranging from terror attacks to natural disasters such as earthquakes. The first series of drills were called TOPOFF, which ran from 2000 to 2009. One of these exercises, a multistate biowarfare attack exercise in 2000, showed participants in Colorado that they had not thought through the consequences of imposing quarantines. In the exercise, the governor had issued a travel restriction order for all of metropolitan Denver, and the CDC had quarantined the entire state of Colorado. The orders created many unforeseen problems, including how to enforce the restrictions, maintain essential community services, and distribute food and medicine (Hoffman 2003).

The second series of federally managed exercises was called National Level Exercises, which ran from 2009 to 2012. Capstone Exercises began in 2012. As required by Presidential Directive, FEMA publishes online a National Preparedness Report annually, which evaluates progress in national preparedness and identifies where challenges remain.

Case Study: Emergency Exercise Reveals Strengths, Lessons Learned

The PACE (Portland Area Capabilities Exercise) Setter emergency exercise simulated a terrorist attack involving a biological weapon for 3 days in the Portland, Oregon region in May 2013 (Regional Disaster Preparedness Organization 2013a, 2013b). The exercise was intended to test the region's ability to respond to a complex public health incident affecting dozens of agencies across several political boundaries.

Key risk-communication lessons learned included:

- During planning, individual agencies would often dominate team meetings with their specific jurisdictional concerns or planning issues. To help keep meetings on task, create avenues for those issues to be resolved outside the large group meeting.
- Local and regional authorities sometimes disagreed on public health risk and response priorities for the exercise. This slowed and sometimes stopped the sharing of actionable messages with the public. Officials needed to agree on risk and response proprieties and commitments in advance.
- WebEOC, a commercially available software to plan exercises and manage incidents, was a powerful tool, allowing team members to display and track the exercise scenario timeline. The tool automatically synced everyone's planning input into a master regional events list, could be accessed from any Internet-connect device, and displayed real-time information. The tool could also be sorted and filtered to allow planners to view and print information numerous ways.
- Despite the value of that tool, access issues slowed communication and response. Not everyone involved had access to the WebEOC platform, the regional e-mail listserv, and other technology-related tools. Some of those who were given access lacked training in using the tools. Participants needed to print from nonnetworked devices, and not enough computing devices were available

during the exercise. The lesson here was to make sure that everyone had access to the necessary tools and training.

- Exercise planning did not address outreach to non-English speaking communities. Future exercises should include a broader range of the public.

The North American Electric Reliability Corporation (NERC) conducts regular exercises called GridEx, designed to simulate a cyber/physical attack on electric and other critical infrastructure across North America. Industry participants take part from their regular work locations and respond to simulated scenario events during the 2-day exercise. NERC also coordinates a tabletop discussion for industry executives and senior government officials on an invitation-only basis.

Participants of GridEx IV, held in November 2017, practiced their response to simulated cyber and physical attacks on the North American power grid. The exercise involved more than 6,500 participants from 450 industry and government organizations in the U.S., Canada, and Mexico. NERC publishes on its website after-action evaluation reports containing recommendations to improve future exercises.

Case Study: Emergency Exercises Use Realistic Social Media Interaction

Social media is a common tool that emergency management and response organizations use to interact with the public before, during, and after a disaster. But how do you use social media in an emergency exercise, making it as realistic as possible, while also keeping the content from public view so as not to cause a panic?

The District of Columbia Homeland Security and Emergency Management Agency held a Hurricane Preparedness Exercise in 2014 that demonstrated effective ways to do this (U.S. Department of Homeland Security 2017). During the exercise involving more than 400 people, risk communication experts Kim Stephens and Cheryl Bledsoe led a team that used real, but protected, social media accounts.

The team created content that tied back to the exercise objectives, master scenario events list, and the event timeline. They used a Google spreadsheet to collaborate on content creation. The spreadsheet was divided into subject areas (shelter, road closures, flooding, etc.) and platforms (Facebook, Twitter, etc.). The team studied real disaster social media posts to write simulated entries. This ensured the content had the same urgency and tone as real posts.

A WordPress-based blog site, de-indexed so searches wouldn’t find it, served as the “newsfeed” for the event; it was updated regularly with press releases, road closure information, and other materials generated by participants. The newsfeed blog helped exercise participants see the bigger picture beyond their own functional areas.

The team used protected Twitter accounts and a closed Facebook group throughout the exercise. Only those approved by the account holders could view and post content. The team used Flickr and YouTube images and video material from past hurricanes that could be repurposed to create a “newsfeed” in the Emergency Operations Center during the exercise.

Google forms were used to create questionnaires and collect information and feedback from all participants during the exercise. The feedback was aggregated and placed on monitors for participants to view.

To send text messages to participants during the exercise, the team used an online texting service. In a real disaster, responders might receive texts and alerts from worried family members, weather watches and warnings, and other information.

Overall, the exercise was a success. Social media by nature is dynamic and quick-moving, which can create complications. Using already-familiar platforms, maintaining the WordPress blog, and giving participants a sense of reality whenever possible helped the exercise accomplish its goals.

Working with Communities in Advance

Besides identifying organizational and team roles, you need to consider teaming with the public. Emergency services personnel, when focused on carrying out their duties, sometimes think of the public as passive bystanders. At the scene of a traffic accident or crime scene, for example, the public is separated from the response operation by the familiar barrier of yellow tape. But a disaster is an event that generates casualties beyond available resources, shattering the yellow tape phenomenon, argue researchers Glass and Schoch-Spana (2002).

There is a tendency toward adaptability, cooperation, and resourcefulness in times of disaster. After Hurricane Harvey dumped more than 50 inches of rain on the Texas Gulf Coast area in 2017, volunteers mobilized to rescue flood victims and transport them to shelters, despite risks to themselves. One group, the Cajun Navy, a grassroots citizens' organization, brought 20 boats to the area and joined emergency responders in pulling hundreds of people out of the water and rescuing them from roofs.

Emergency preparedness programs are increasingly planning ways to capitalize on the work of nonprofessionals, especially in identifying, surveying, and containing a disease outbreak and caring for a large number of casualties. In responding to a bioterrorism incident, health and biodefense researchers suggest that church groups could distribute antibiotics, convene vaccination meetings, or arrange visits to the homes of people who are ill (Glass and Schoch-Spana 2002). Social groups such as the Kiwanis or Rotary Clubs might activate phone trees to gather case reports, trace contacts, or disseminate instructions on appropriate use of medications. In its SARS communication plan, the CDC recommended that the American Lung Association and other groups could be helpful in disseminating educational messages to community groups about SARS (CDC 2003).

> A legitimate sense of control can be given to those under threat, especially in advance of an attack, by public education, by public participation in the preparation process, and by providing the public a voice in the decisions that will affect them.
> —Vince Covello et al. (2001, p. 389)

Case Study: Best Practices Suggest Ways to Get People to Evacuate Before a Disaster Hits

Despite evacuation warnings before a hurricane or other disaster, some people refuse to leave their homes—resulting in their deaths. By documenting a series of case studies, researchers have shown that the following risk communication strategies can be effective in convincing people to evacuate (Cuite and Morss 2017):

- Show specific geographic areas to be evacuated and explain why the residents there are in danger.
- Use consistent messaging. Before Hurricane Harvey hit in 2017, the Texas governor told Houston citizens to evacuate while the mayor was simultaneously telling them to shelter in place.
- Make sure people have all the information they need to evacuate: shelter locations, places that take pets, necessities to take with them, and ways for people with disabilities and other vulnerable citizens can get help evacuating.
- Communicate about traffic coordination. People are likely to take every vehicle they have, fearing that any left behind will be damaged or looted. And where a large population may need to evacuate in the same direction, traffic issues are especially dangerous. Tell them the best roads to take, fuel availability and locations, and locations of rest areas.
- Make warnings as specific as possible, setting a deadline for people to leave. Say things like "now you should be . . ." and "by 5 a.m. tomorrow you should be . . ." filling in the phrases with specific directions.
- Avoid fear appeals ("You will face certain death if you stay"). People may disregard this language as overhyped and not trustworthy.
- Don't compare upcoming new storms to past ones. Making comparisons can give residents a false sense of security. ("I survived the last hurricane without leaving my home; I can survive this one too.")
- Avoid the term "voluntary evacuation." Make it clear that residents are being ordered to leave, even if they won't be forcibly removed from their homes. If they refuse to leave during a mandatory evacuation order, they should not expect rescue or other lifesaving assistance.
- Forecasters, emergency managers, the media, and coastal residents should work together to help people understand which risks they face from that specific storm and how they can best protect themselves.

A response to emergencies should capitalize on people's desire to help others, especially through the use of existing social groups.

Some U.S. communities use Citizen Corps, a national network that involves citizens in helping prepare for and recover from disasters and other threats. Through training and education, Citizen Corps help citizens prepare for local risks as well as augmenting public safety, preparedness, and response capabilities in their communities. FEMA coordinates Citizen Corps nationally. As of 2017, there were more than 1,170 county, local, or tribal Citizen Corps Councils and 56 state or territory Councils. Communities can find their nearest Citizen Corps Council and learn more at https://www.ready.gov/citizen-corps.

Beyond harnessing public volunteers, participatory decision-making processes should be used in developing emergency risk plans. During the West Nile virus outbreak in 1999, risk communication researcher and consultant Vince Covello argues that New York City officials did not do enough to understand stakeholder concern about certain actions the city took. For example, wildlife experts and environmental groups became outraged about the city's decision to use the pesticide Malathion for disease control, using aerial spraying by highly visible helicopters (Covello et al. 2001). He advocates using citizen advisory panels or other community leaders for responses that require a community's ethical judgment. These might include setting priorities for use of scarce medical resources, such as antibiotics and vaccines, or instituting epidemic control measures that compromise civil liberties.

Determining Appropriate Communication Methods

When disaster strikes, people want as many information sources as possible, including traditional media and social media. Those sources are described in more detail elsewhere in this book. This section describes other forms of communication used in emergencies.

The Internet

Websites that are updated frequently can be good resources in helping the public know what to do in case of emergency and how to respond when one occurs. For example, a chemical weapons depot had a website containing a wide variety of emergency response information. Among the items was a map showing school locations in each surrounding county, with designated emergency plans for each (shelter in place, evacuate, etc.). The site also included instructions for citizens to prepare for an emergency, including sound clips of warning sirens, and what to do during an emergency. Also included was an archive of press releases, updated as new ones are issued, as well as contact information for public information officers.

Google Person Finder launched within 90 minutes of the 2011 earthquake in Fukushima, Japan. It ultimately mobilized 5,000 volunteers to help create profiles. The site was successful because it coordinated its work with authorities, who possessed refugee and casualty information; it ultimately registered 590,000 people, which equaled the total number of refugees. The centralization of information—and avoidance of duplicative, competing efforts—was key to its success. Also on the same day as the earthquake, Google launched its Crisis

Response page, a central repository in Japanese, English, Chinese, and Korean (Solymossy 2013).

Hyer and Covello (2005) recommend the following tips for using websites in emergencies:

- Predevelop basic content to be quickly uploaded in the event of an emergency.
- Include appropriate contact information, such as a hotline.
- Ensure that everything on the website has been approved for accuracy.
- Include links to partner websites that also have information on the emergency, and provide information for their websites.
- Update your website as information changes.

For public health emergencies such as epidemics, the Pan American Health Organization suggests that websites include the following information as well:

- Reports from various agencies, including situation reports on health agencies
- Maps and data on damage
- Information on epidemiology and the status of health care facilities
- Photographs associated with the emergency
- Recommendations of actions for the public to take
- Press releases and other information targeted to the news media
- Background information on the location, the disease, and the population affected
- Links to other credible information sources (Barrantes et al. 2009)

Be aware that the Internet, though remarkably resilient in times of emergency, has its limitations. Unprecedented levels of user demand immediately following the 2001 terror attack in New York City severely stressed the server computers of news websites. Web service providers quickly took a number of steps, such as reducing the complexity of web pages, using alternative mechanisms for distributing content, and reallocating computing resources, to respond successfully to demand. In some cases, automatic rerouting at the physical or network levels allowed some Internet traffic to bypass many of the infrastructure's failed parts. More unexpectedly, however, Internet services in parts of Europe and South Africa lost connectivity because of their connections with the rest of the Internet in New York City. Voice-Over Internet Protocol and interfaces such as Skype are increasingly being used as alternative methods of telecommunication in emergencies. These methods make it possible to transmit voice through the Internet. Still, even that system can be stressed in times of high usage.

Many telecommunication networks now prepare in advance for disasters. When Hurricane Harvey flooded southeast Texas in 2017, companies such as Verizon and AT&T were ready. They deployed mobile cell sites on light trucks to the affected areas, as well as charging stations and emergency communications vehicles. They pre-arranged fuel delivery to their cell sites' backup generators. They also used drone technology to survey damage to their infrastructure (Lapowsky 2017).

The National Research Council (2003) recommended that key businesses and services that must operate in a disaster should:

- Provide redundant network connectivity, from more than one network provider and by way of more than one physical link or conduit
- Perform an end-to-end audit of Internet dependencies
- Establish plans for dealing with greatly increased traffic loads

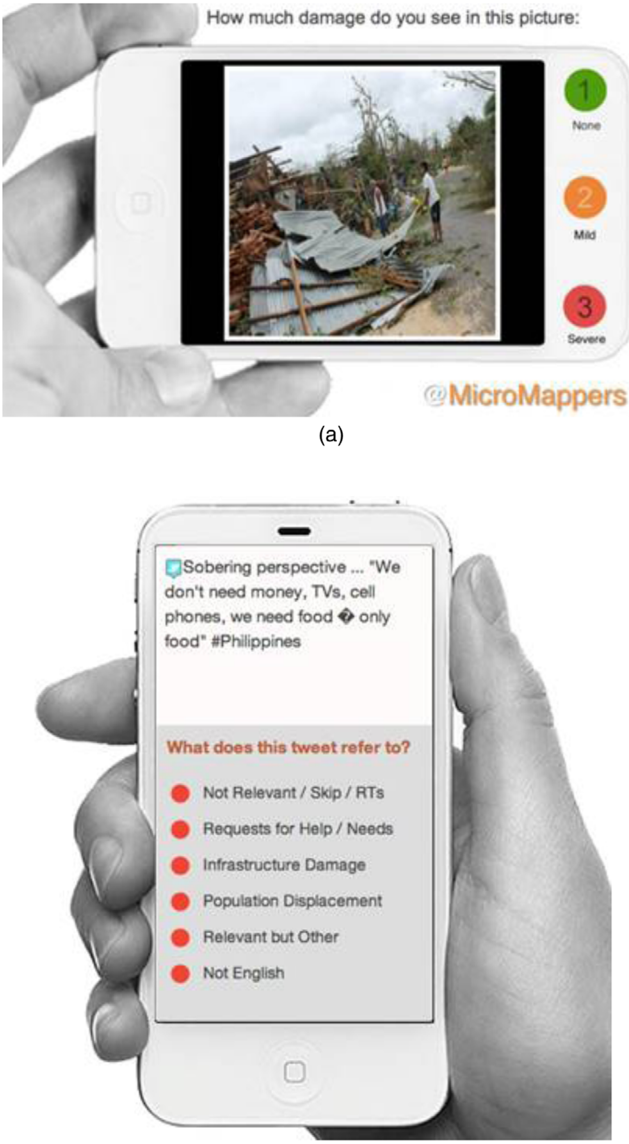
Chapter 18 describes Internet-delivered communication in more detail.

Social Media and Crowdsourcing

For years, citizen volunteers have been using and adapting web-based technologies, satellite-based imagery, and social media to respond during and after disasters. Called crowdsourcing, or sometimes volunteer technical communities, this method mobilizes volunteers and technologies to respond rapidly in emergencies and other situations. Such efforts have led to citizen-developed tools such as mapping the areas impacted by crises and finding people who had been forced to evacuate.

Crisis Commons is one example of an organized global network of volunteers dedicated to using open technologies to help in times of crisis. At the time of this writing, the group claimed more than 3,000 trained volunteers who apply technical, social media, organizational, and other skills to analyze, plan, report, respond, translate, and document. These volunteers have participated worldwide in over 30 cities across 10 countries, including France, United Kingdom, Canada, New Zealand, Chile, and Colombia. One example was creating a "Craigslist" of self-identified needs and requests by nonprofits assisting in Haiti relief operations after a 2010 earthquake.

In 2013, the United Nations Office for the Coordination of Humanitarian Affairs activated the Digital Humanitarian Network in response to Typhoon Yolanda, a devastating storm in the Philippines. Volunteers worldwide carried out a rapid need and damage assessment by tagging 105,000 relevant tweets and photos on social media in the days after the crisis (Figure 22.1a and b). Each uploaded tweet and image was evaluated by (at least) three individual volunteers for quality control purposes. The results were used to create an online crisis map that humanitarian organizations used to target aid on the ground.



How much damage do you see in this picture:

1
None
2
Mild
3
Severe
@MicroMappers
(a)

Sobering perspective ... "We don't need money, TVs, cell phones, we need food � only food" #Philippines

What does this tweet refer to?

Not Relevant / Skip / RTs
Requests for Help / Needs
Infrastructure Damage
Population Displacement
Relevant but Other
Not English
(b)

Figure 22.1. (a) Crowdsourcing with social media after a storm in the Philippines. Volunteers tagged photos and their locations as part of the crisis response effort. (Source: Patrick Meier; used with permission.) (b) Crowdsourcing with social media. Volunteers tagged tweets and photos, then used them to create an online crisis map to support response on the ground. (Source: Patrick Meier; used with permission.)

Crowdsourced mapping was used effectively in another crisis in 2015. A 7.8 magnitude earthquake hit Nepal, killing more than 9,000 people and injuring more than 23,000. Much of the infrastructure around the country was severely damaged, leaving hundreds of thousands without shelter or necessities.

Kathmandu Living Labs, an organization dedicated to enhancing resilience and civic engagement in Nepal, deployed the Ushahidi and OpenStreetMap platforms to collect reports from people in the affected areas. The organization produced an online, real-time map that allowed thousands of citizens to report in real time exactly what kind of help was needed and where (Figure 22.2a and b; Forrest 2015). Reports frequently arrived via mobile apps and social media.

Staff and volunteers processed more than 2,000 reports coming in from towns and villages across Nepal. This helped agencies see what was happening on the ground as it was unfolding. Organizations such as the Red Cross could see who needed what kind of relief, when and where. They could then follow up to see that aid was delivered.

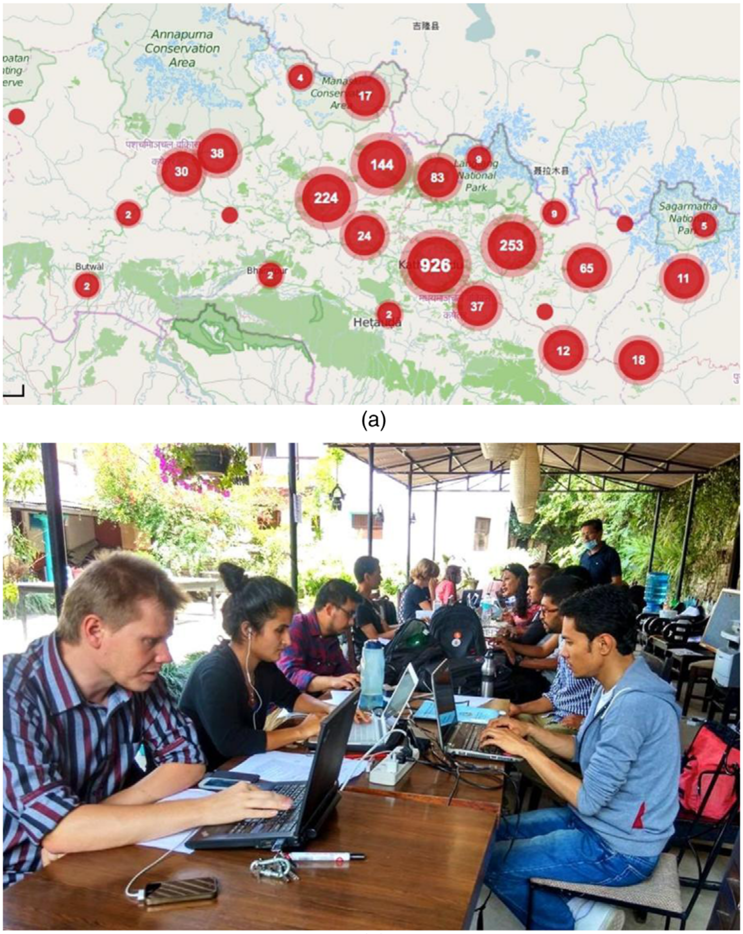
For example, the map was used in efforts to evacuate people who were stranded at a relief center that was between dangerous landsides. In another neighborhood, crowdsourced follow-up showed that roads had been cleared, new water pipes were installed, and multiple food drops were confirmed.

Similarly, when Hurricane Harvey hit the Houston, Texas area in 2017, a group of programmers, led by a civic tech organization in Houston, built a nearly real-time map showing locations of shelters, whether they were still accepting occupants, and what supplies were needed at each location (Shah 2017; Figure 22.3).

Safecast is another successful crowdsourcing effort that combines environmental monitoring and mapping. This volunteer-led project was launched within a week of the Fukushima, Japan nuclear disaster, when accurate and trustworthy radiation information was lacking (Solymossy 2013). Safecast volunteers monitor, collect, and share information on ionizing radiation measurements and display them in online maps. The scope has since expanded to include air quality monitoring data. As of 2017, more than 50 million data readings had already been mapped, making Safecast one of the largest crowdsourced environmental monitoring project in the world.

Other organizations whose missions include emergency response are finding more ways to better integrate crowdsourcing in their planning and operations. Risk communicators should determine whether such crowdsourcing efforts may be useful for partnering. Partners should specifically address roles and responsibilities, reliability and accuracy of information created and shared, work scope, products to be created and used, liability, and privacy issues. For more information on partnering, see Chapter 20.

Computer scientists are developing more ways to use social media to reach targeted groups of people at risk, thereby helping communities prepare for and respond to unexpected disasters. One example is social triangulation. This is a way to find and target social media users according to the characteristics of their social


Annapurna Conservation Area
Butwal
Hetauda
Sagarmatha National Park
926
253
224
144
83
65
38
37
30
24
18
17
12
11

(a)

(b)

Figure 22.2. (a) Nepal crisis map. After a devastating earthquake in Nepal, volunteers created this real-time, online map showing where people needed help. Clicking on each numbered circle showed what kinds of help were needed, as reported by those on the ground. (Source: Kathmandu Living Labs; used with permission.) (b) Volunteers keeping calm and carrying on. After their headquarters was damaged by the Nepal earthquake, crowdsource volunteers moved outside, where they continued to develop the real-time relief aid map. (Source: Kathmandu Living Labs; used with permission.)

networks (Homeland Security News Wire 2017). Even when users don't include explicit geographic information through geotags, their social networks can hold many clues to their whereabouts and interests. With that information, risk communicators tailor the type of message to the type of people they want to reach. For example, in preparation for a hurricane, officials could identify and

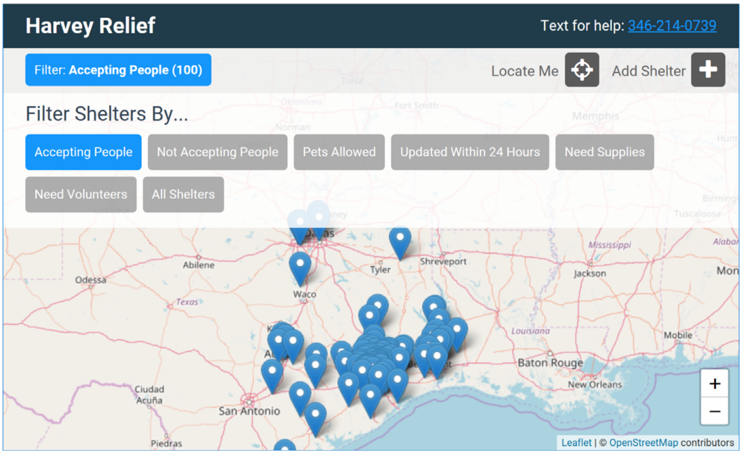

Harvey Relief
Text for help: 346-214-0739
Filter: Accepting People (100)
Locate Me
Add Shelter
Filter Shelters By...
Accepting People
Not Accepting People
Pets Allowed
Updated Within 24 Hours
Need Supplies
Need Volunteers
All Shelters
Abilene
Odessa
Texas
Waco
Tyler
Shreveport
Mississippi
Jackson
Louisiana
Baton Rouge
New Orleans
Mobile
Ciudad Acuña
San Antonio
Piedras
Leaflet | © OpenStreetMap contributors

Figure 22.3. Hurricane crisis map. A Houston, Texas tech organization built this real-time map after Hurricane Harvey hit, helping thousands of people who were evacuated from their homes to find temporary shelters. (Used with permission; © OpenStreetMap contributors, http://www.openstreetmap.org/copyright).

partner with local veterinarians' social media channels to reach out to their followers and recommend shelters that are available to house pets.

For more details about using social media in crisis or emergency situations, see Chapter 19.

Telecommunications

Although telecommunications systems can be severed during an emergency, many communities rely on them for emergency communication. In the aftermath of the 2001 terrorist attacks in New York City, for example, the public used low-bandwidth e-mail and instant messaging as substitutes for telephone service, especially where telecommunication congestion was high.

Beginning in 2012, government agencies partnered with wireless carriers to send geographically targeted text alerts to the members of the public who registered for alerts. Subscribers get presidential messages, AMBER alerts, and imminent threat alerts to mobile phones using a broadcast technology that will not get backlogged during emergencies when wireless voice and data services can become congested.

At the time of this writing, several municipalities and services also offer the ability for residents in specific geographic areas to receive emergency notifications via phone, text, and/or e-mails. Citizens register to be notified. One such service is Reverse 911®. Cities have used such services to send alerts for flood and wildfire evacuations, neighborhood alerts of police manhunts, missing toddlers and

Alzheimer's patients, boil water notifications, hazardous material releases, and escaped prisoners.

In a shooting incident at Virginia Tech in 2007, campus officials were criticized for delaying campus-wide alerts of the first shooting by almost 2 hours, before more people were killed. Since then, most universities have upgraded their campus-wide communication systems. Many are asking students, faculty, and even parents to register or subscribe at a central website to receive alerts so that the universities can send message by cell phone, text message, and e-mail in case of emergency or situations such as weather-related closures. Users must be assured that their information will be kept private and must keep their contact information updated.

Wireless devices also are playing stronger roles in terrorism prevention and response efforts. According to emergency preparedness expert Michael Hopmeier, even when people are prepared ahead of time, terrorism's randomness and uncertainty require authorities to use technologies that reach the greatest number of people in the least amount of time. He also suggested that citizens can also be "digitally deputized" to report suspicious activities by using their cell phones, text messaging, or even by sending photos of suspicious individuals to a central reporting unit. For example, in Iraq, civilians can anonymously pass information to authorities from the safety of their own homes.

Because word travels fast by cell phones and through social media, it is especially important to make sure that messages are accurate and to correct misinformation. In 2008, massive earthquakes occurred in the Sichuan province of China. Students and others quickly disseminated the information via social media services such as Twitter and Fanfou, text messaging, and online videos that reached millions. In one case, incorrect predictions of the exact times for aftershock quakes in Beijing and Shanghai were sent via text message, forcing the state-run Xinhua news agency to run a story to forestall widespread panic.

In another case, in 2006, jubilant emergency response workers in West Virginia conveyed the good news that 12 trapped miners were found alive. The word quickly spread via cell phone and was transmitted by national media. Though the emergency plan called for strict vetting and use of an approval chain to release information, people succumbed to the natural desire to celebrate. When the truth came out that only one miner had survived, public outrage ensued.

Creative Alternatives

Lower-tech communication options may be necessary when electricity is out, cell phone towers are inoperable, or digital devices are slowed by traffic and viruses.

When Hurricane Katrina hit Louisiana in 2005, the CDC found that it could not deliver public health information through its usual electronic channels. In addition, overnight delivery service was curtailed, and even a CDC-chartered truck was turned back because roads were impassible. Instead, the CDC deployed 30 health and communication specialists to local and state health departments in

Louisiana, Mississippi, and Texas. At evacuation and emergency response centers, these field workers identified and filled information needs, sometimes even hand-delivering copies of printed health guidance to workers and affected communities. Information included where to find water and ice, avoiding electrical hazards, avoiding injuries during cleanup, and managing stress to prevent violence.

During this time, the CDC restructured its health messages and channels as needed.

For example, it used door hangers for door-to-door delivery of carbon monoxide prevention materials, stickers in evacuation centers to remind children about hand hygiene, and later, one-line messages for high-frequency radio broadcasts. CDC also taped public service announcements in Atlanta and hand delivered them to be broadcast in evacuation centers and local hardware stores.

> Lower-tech communication options may be necessary when electricity is out, cell phone towers are inoperable, or computers are slowed by traffic and viruses.

For its 2012 storm response, emergency managers in Arlington, Virginia, created flyers with critical information on heat safety and asked its Community Emergency Response Teams to distribute them to the most vulnerable residents. The city coped with the loss of its 911 system by staffing every fire station 24/7 with emergency or public safety personnel, equipped them with public safety radios, and instructed the public to go to any fire station should they be unable to reach the 911 center (Solymossy 2013).

Case Study: Got the Flu? Tell Us With Your Door Hanger!

A small county health department came up with a low-cost, low-tech, but effective way to communicate with residents during a disease outbreak.

In preparation for an outbreak like a flu pandemic, the Sierra County Health Department in California printed and distributed color-coded door hangers to everyone in the county (CDC 2009). Three double-sided door hangers made of card stock were distributed to each home along with instructions on how to use the hangers and information about the potential outbreak.

Each side of the hanger has a different color. During an outbreak, residents would hang a different color hanger on the front door to indicate the health status of those inside the home, to be seen by law enforcement on patrol.

Residents can write on the yellow tags if they need something. Red tags indicate that someone needs emergency assistance. Black tags indicate that someone inside the house has died.

With this approach, residents get health and safety information without exposing emergency responders to a potentially contagious outbreak. And emergency responders can notify the appropriate officials depending on the health status.

Officials noted that this system might be too labor-intensive and difficult to track if implemented in a major metro area. But it worked well for those living in the 1,500 homes in Sierra County.

This example shows that a high-tech solution is not always the best for communicating risks. Think about what works for all stakeholders in your particular situation and plan accordingly.

Following Japan's 2011 "triple disaster" of earthquake, tsunami, and nuclear crises, communities consistently cited radio as the most useful source of information. One factor was the Japanese government's system, previously in place, to grant temporary emergency radio broadcasting licenses; 21 new disaster radio stations were established within a month of the earthquake. Radios are inexpensive and can be powered by batteries, solar, or hand-cranking during power outages. Radio transmission became such an important channel that the federal government distributed 10,000 portable radios to evacuation centers and asked radio manufacturers to contribute tens of thousands more. People also listened to car radios. After conditions improved, community radio continued to broadcast, serving as a source of comfort and support to residents (Solymossy 2013).

In 2012, after Hurricane Sandy knocked out power in some neighborhoods, volunteers pedaled stationary bicycles to generate power to recharge cell phones (Solymossy 2013).

In 2003, a soy-based baby formula lacking vitamin B1 was found to have caused several infant deaths in Israel. The milk substitute had been widely used in orthodox Jewish communities because of its kosher certification. When the problem was discovered, the Jewish Sabbath, which forbids electricity use, had already begun. Lacking access to electricity-powered mass media to reach the target audience, Israeli health authorities sent trucks equipped with loudspeakers into Orthodox Jewish neighborhoods, warning parents not to use the formula.

The point here is to plan low-tech or other creative alternatives for communicating risks before an emergency hits. Ask yourself how you would communicate the most important messages to affected communities without power, broadband networks, or cellphone towers, and plan accordingly.

Developing an Emergency Risk Communication Plan

Chapter 12 includes most of what is needed for emergency risk communication planning. However, because of the differences alluded to earlier, emergency risk communication plans include additional elements or cover some elements in greater detail. For example, a group of researchers on risk assessment and risk communication who gathered in Israel to determine best practices during emergencies recommended that pre-event risk communication plans should include actions that would share clear precautions, reassure the public, reduce unnecessary stress, and limit demands on health care (Green et al. 2007).

Many of the following suggestions are adapted from guidance by the CDC, which has done extensive public health emergency planning and training. See the "Additional Resources" section of this chapter for other organizations with emergency communication plans. You can also request the emergency communication plan for your state and other public jurisdictions. By law, these plans must be created and maintained.

In addition to the elements in a typical risk communication plan, an emergency risk communication plan needs to pay particular attention to the following areas:

- **Identification of organizations and individuals who are responsible for various activities.** These groups include the public information team, public health officials, emergency responders, law enforcement agencies, elected officials, and community organizations. A key role is played by the spokesperson for various issues. According to Catherine DesRoches of the Harvard School of Public Health, the most credible spokespersons in an emergency such as a disease outbreak or bioterrorism are a person's doctor, the director of the local fire department, director of the local hospital, director of state or local police, and director of the state or local health department (DesRoches 2003).
- **Identification of organizations and stakeholders who need to receive and, in some cases, convey information during the emergency.** Emergency risk communication plans should describe stakeholders' likely concerns and how those will be addressed. Table 22.3 shows some examples of concerns associated with various groups.
- **The process for information verification and approval.** Especially when many organizations are required to team to respond to an emergency, the process for determining which information is accurate and who can approve its issuance is vital to successful communication. The simpler the process, the better, for time is always a scarce commodity in an emergency.
- **Procedures to get the needed resources.** In an emergency, public information officers will need space, equipment, staff, and supplies, around the clock. Consider designating an emergency operations center that can be deployed when needed.
- **Identification of communication methods.** Include how information will be disseminated and gathered (such as about disease spread) and how questions will be answered (media, hotlines, websites, e-mail lists or listservs, phone banks, town hall meetings, social media, conference calls, telebriefings, door-to-door canvassing, stakeholders, partners, etc.). Include alternative methods for times when regular channels of communication are disrupted.
- **Use of social media.** Identify which social media channels you will use; who will use them; what information should be covered on each; your approval process; and how comments, questions, rumors, and misinformation will be addressed. For example, you may want to establish or use a hashtag about the emergency, and direct people to a website or live blog for facts and announcements. Know how your social media communication will integrate

Table 22.3. Examples of Stakeholders and Their Concerns in an Emergency[a]

Stakeholder	Likely concerns
Public in the disaster, for whom action messages are intended	Personal, family, and pet safety; property protection; stigmatization
Public immediately outside the disaster, for whom action messages are not intended	Personal, family, and pet safety; interruption of normal-life activities
First responders	Resources to accomplish response and recovery; personal, family, and pet safety
Public health and medical professional responders	Personal safety and resources adequate to respond
Family members of victims and first responders	Personal safety, safety of victims and response workers
Health care professionals outside response	Vicarious rehearsal of treatment recommendations, ability to respond to patients with appropriate information, and access to treatment supplies
Civic leaders: local, state, and national	Impacts (lives, property, environmental damage), leadership, response and recovery, resources, quality of response and recovery planning and implementation, expressions of concern, liability, international relations
Congress	Informing constituents, disaster funding, review of statutes and laws for adequacy and adjustment needs, and expressions of concern
Trade and industry	Business issues (protection of employees, loss of revenue, liability, and business interruption)
National community	Vicarious rehearsal and readiness efforts
International neighbors	Vicarious rehearsal and readiness efforts
International community	Vicarious rehearsal and exploration of readiness
Stakeholders and partners	Included in decision making and access to information specific to the emergency
Media	Personal safety, access to information and spokespersons, and deadlines

[a] Adapted from various CDC resources.

with other communication channels and messages. Know how your organization will express sorrow and grief, if the situation warrants. Many organizations incorporate social media into their emergency training, table-top exercises and post-crisis evaluation to test and refine their plans. (See Chapter 19 for more detail on social media in risk communication.)

- **How vulnerable populations will be informed.** These populations could include, for example, the elderly, unvaccinated, non-English speakers, and people with chronic respiratory illness. (See the section "Vulnerable Populations" later in this chapter.)
- **Methods for analyzing media content and public information calls.** Emergency risk communication, like other forms of risk communication, needs to be two way. Determine how you will gather information from stakeholders in real time during an emergency. Use stakeholder input to make sure that accurate information is conveyed and to understand what still needs to be addressed.

The emergency risk communication should also include a contact list for local and regional media, with information on after-hours news desks. Also useful is a list of subject matter experts outside your organization who can speak to other aspects of the emergency and can augment your recommendations during an emergency. Researchers studying emergency risk communication around the globe suggested that this information should be in both printed copy and electronic version, and include, in addition to the contacts listed earlier in this chapter, contacts for external crisis communication consultants (George 2012).

Rene Henry, former head of communications for the Atlantic States region for the U.S. Environmental Protection Agency, suggests some additional things to include in an emergency risk communication plan (Henry 2000):

- A list of all communications team members and work and home contact information
- The phone tree showing how to contact other organization staff
- A policy statement regarding who can speak for the organization and under what conditions
- Guidelines for communicating with the news media, including how information can be released, the locations where they will be briefed, how their credentials will be validated, where their television and satellite uplink trucks can be parked, and alternative locations and plans
- Procedures to follow in the event of loss of electricity or phone service or if the primary communication location is unavailable
- Contact information on all stakeholders who will be notified in an emergency and the priority in which they will be notified

Additional Considerations in Emergency Risk Communication Planning

Besides completing the emergency risk communication plan, organizations need to make sure that the following equipment will be readily available during an emergency:

- Computers on a local area network with e-mail listservs designated for partners and media
- Website capability around the clock, so new information can be posted as quickly as possible
- Copiers, audiovisual equipment, and office supplies
- Cell phones and other handheld devices
- Visible calendars, flow charts, bulletin boards, message boards, and easels
- Portable microphones, lectern, and lighting for live video
- Small refrigerator and microwave oven for staff working around the clock

"Go kits" include a computer, the risk communication plan, a cell or satellite phone, and other pieces of equipment and information communicators need if they must abandon their normal place of operation.

In addition, the CDC recommends portable "go kits" for public information specialists who may have to abandon their normal place of operation. These kits should include a computer capable of linking to the Internet and receiving e-mail, links to files containing the elements of the emergency risk communication plan as well as contact information, a cell or satellite phone, a credit card or other funding mechanism to purchase operational resources, and background information to provide to the public, media, and social media platforms.

Certain pieces of information can also be prepared ahead of time. Rene Henry, who lived through a number of emergencies, recommends developing the following materials and keeping them current for use in emergencies:

- Fact sheets on the organization. For industry, this information should include products and services; for government agencies, this information should include their role in an emergency.
- Biographical sketches of key managers and spokespeople
- Maps, diagrams, and other basic information about facilities
- General news releases about the organization (Henry 2000)

Vulnerable Populations

Planning for communication before and during an emergency is especially important for vulnerable or at-risk populations. The Pandemic and All-Hazards Preparedness Acts defines at-risk populations as those whose needs are not fully addressed by traditional service providers or who feel that they cannot comfortably or safely use the standard resources offered during preparedness, response, and recovery efforts. These groups include people who are physically or mentally disabled, people with limited English language skills, geographically or culturally isolated people, homeless people, senior citizens, and children.

Why is it important to account for at-risk populations in emergency communication? Federal requirements set some ground rules. Limited-English populations qualify for the same antidiscrimination protection as that for race, color, or national origin under Title VI of the Civil Rights Act. The Post-Katrina Emergency Management Reform Act of 2006 includes provisions to account for limited-English groups in disaster-planning processes. The 2006 Pandemic and All-Hazards Preparedness Act required the U.S. Department of Health and Human Services to integrate the needs of at-risk individuals into emergency planning.

Research reinforces the need for special outreach to vulnerable groups. Racial and ethnic communities have been found to be more vulnerable to natural disasters, as a result of such factors as language, housing patterns, building construction, community isolation, and cultural insensitivities (SAMHSA 2017). Some have settled where land is less expensive, such as low-lying flood plains, and, consequentially, is disproportionately vulnerable to flooding following tropical storms. In addition, many minorities may find it more difficult to recover from a disaster because of lower incomes, fewer savings, greater unemployment, less insurance, and less access to communication channels and information. The existence of other health disparities, such as heart disease and diabetes, compounds the negative impact of a natural disaster among these groups.

> I have juvenile rheumatoid arthritis and use a wheel chair. We had a bomb threat at work, which was very scary. Everyone evacuated, but I was still left on the 3rd floor by the stairwell for the firefighter to come get me. But, no one came. It was scary just to realize that there are not really any procedures in place to help someone like me in an emergency.
>
> —Anonymous survey respondent, Nobody Left Behind Research and Training Center on Independent Living, University of Kansas

Another challenge is access to communication sources. As of 2016, 13% of U.S. adults didn't use the Internet. Racial minorities, older adults, rural residents, and those with lower levels of education and income were less likely to have broadband service at home (Pew Research Center 2017). As of 2017, just over half of populations worldwide used the Internet, with North America the highest at 88.1%, Africa the lowest at 31.1%, and Asia, Europe, Latin America, the Middle East, and Oceania/Australia in between (Internet World Stats 2017). Those who do not plan in advance to reach at-risk groups have suffered the consequences. After the hurricane and Fukushima nuclear reactor accident in Japan in 2011, the government was criticized for not clearly explaining the variations in the risk of radiation exposure regarding groups that may have been more susceptible, such as infants, youths, and expectant mothers (The National Diet of Japan 2012). The Government Accountability Office criticized the CDC for failing to reach non-English-speaking groups during the H1N1 pandemic of 2009 (GAO 2011).

During Hurricane Katrina in 2005, Latinos with limited English proficiency had difficulties understanding warnings and instructions in English. Immigrants accustomed to the metric system had difficulty interpreting weather reports that referred to the storm's strength and direction expressed in miles per hour. Some of the newer Latino immigrants from Mexico had little or no prior experience with hurricanes and did not anticipate the storm's severity. The importance of the extended family, which is often more cohesive in minority communities, also played a part. Obligations to the extended family, especially elderly members who resisted evaluation, delayed Latino responses during hurricane warnings (Eisenman et al. 2007).

The good news is that there are a variety of resources to help. At the time of this book's publication, an excellent starting point was the website of the National Resource Center on Advancing Emergency Preparedness for Culturally Diverse Communities (http://www.diversitypreparedness.org). This center, a project of Drexel University School of Public Health with federal support, is a clearinghouse of current information and resources to plan, serve, and engage culturally diverse communities in emergency preparedness, response, and recovery. Resources include links to data sets, policy, research results, guidelines and toolkits, training and education, and materials about disaster preparation and survival. Users can search for resources that apply to their own states, populations of interest, language, organization, and target audience.

The CDC has an online workbook providing guidance to state and local planners to reach at-risk populations, including racial and ethnic minorities, in disasters (Office of Public Health Preparedness and Response, Centers for Disease Control and Prevention, Department of Health and Human Services, No Date). The workbook is a treasure trove of practical and useful tools, templates, and checklists for defining, locating, and reaching special populations. It even describes how to use free online software to generate digital maps that show where the vulnerable populations and outreach resources are located in your community.

The U.S. government's Ready.gov website includes emergency preparation tips for special populations including those with disabilities, seniors, those with pets and other animals, students on campus, and tribal populations.

Researchers and experienced practitioners generally recommend the following elements for risk communication that serves vulnerable populations:

- **Identify applicable policies, existing guidelines, and roles of existing** organizations related to emergency and public health communication in the geographic region of interest.
- **Develop partnerships** with organizations that are already linked with the populations of interest, such as human service agencies and faith-based organizations. They already work with the people you are trying to reach and are viewed as a trusted source of information by their members. For example, the Minnesota Department of Health and that state's Emergency

and Community Health Outreach (ECHO) used its network of community resources, including trained translators, to reach Somalis during a measles outbreak and ethnic populations during a fish contamination incident. After reports of explosives-packed printer cartridges directed at Jewish entities in 2010, the Greater Boston Jewish Emergency Management System quickly communicated information from U.S. government agencies to 200 Jewish agencies in the network. See Chapter 20 for more details on partnerships.

- **Define and locate the at-risk populations and their spokespersons/gatekeepers.** This many include establishing criteria for special populations to be served, conducting needs assessments, and collecting data. Geographic mapping is useful for understanding where major groups reside. Understand each group's knowledge, attitudes, and practices related to emergency preparedness, including whom they trust and how they receive information. Some populations, for example, may have a distrust or fear of government and health institutions and may be more likely to trust local officials and agencies than federal ones (Wray et al. 2006). New American Media, an association of 3,000 ethnic media organizations, is a good source for determining which mass media outlets reach certain populations.
- **Involve representatives of the populations when developing emergency communication plans and information materials.** Culturally tailored and linguistically appropriate emergency risk communication goes beyond literal translation.
- **With community partners, conduct training and, if appropriate, drills or exercises focused on the vulnerable populations, then modify plans accordingly.** In San Francisco, for example, the NICOS Chinese Health Coalition established a Chinatown disaster response program, including an annual large-scale disaster drill.

COMMUNICATING DURING AN EMERGENCY

Communicating ineffectively during an emergency can have negative or even disastrous consequences (see Fukushima case study).

Case Study: Communication Missteps Tarnished Fukushima Risk Communication

In many ways, the tsunami and subsequent nuclear reactor accident at Fukushima, Japan, in 2011 was a prime example of what not to do during an emergency. According to an official report (The National Diet of Japan 2012), the key risk communication mistakes and their consequences during the emergency were:

- **Communication delays.** Plant operator Tokyo Electric Power Company (Tepco) was slow to relay information to the government. The prime minister's office waited too long to declare a state of emergency. In communicating with the public near the plant, officials emphasized detailed accuracy at the expense of quickly getting the information to those who needed it for informed decisions.

- **Confusion about roles, lack of trust.** The prime minster traveled to the plant during the crisis to direct the workers who were dealing with the damaged core. This "unprecedented direct intervention . . . diverted the attention and time of the on-site operational staff and confused the line of command," the report said. "Had the head office of Tepco actively communicated the on-site situation from the start, and explained the severity of the situation to the other parties," the report said, "there is a possibility that the distrust—and the confusion in the chain of command that followed—could have been prevented."
- **Lack of preparation.** Regulators' negative attitudes toward revising and improving existing emergency plans resulted in a lag in upgrading preparedness and disaster countermeasures. The lack of updated emergency response plans contributed to delayed and confusing evacuation orders and public communication about radiation risks.
- **Inaccurate and confusing instructions to the public.** The cabinet secretary repeatedly stated that there were no immediate health effects from the release of radiation, giving the public a false sense of security. Residents therefore did not understand why an evacuation was necessary or urgent. Even as damage from the accident began to escalate, evacuation orders were chaotic. Many residents were unaware of the accident, its severity, or the radiation release. Evacuation orders were repeatedly revised as the evacuation zones expanded from the original 3-km radius to 10 km and later, 20 km, all in one day. Each time the evacuation zone expanded, the residents were required to relocate. Some evacuees were unaware that they had been relocated to sites with high levels of radiation. Dozens of patients in hospitals and nursing homes died from evacuation-related complications.

These unfortunate mistakes underscore the importance of planning for and practicing risk communication responses in exercises, regardless of how unlikely a disaster may appear to be.

Understanding the principles described here, and conducting emergency response exercises with all stakeholders to surface issues in advance, will go a long way to communicating effectively in a disaster.

Studies show that the earliest information needs to address people's basic needs, including food and water, safety, and shelter (Green et al. 2007). As one expert said in retrospect about the 2011 Fukushima nuclear power plant accident,

> Vicarious rehearsal occurs when those not susceptible to the risk believe themselves to be at risk and act accordingly. Those "worried well" may flood hospital emergency rooms or otherwise overload public health resources. They may also divert resources away from more urgent use elsewhere.

"Forget the educational messages that we prepared. The public wants to know if it is safe for themselves and for their kids. And, if not, what do they do about it, period. They don't care what a Sievert is" (Center for Biosecurity of UPMC 2012).

The first 48 hours of an emergency are likely to be the most challenging. Table 22.4 shows communication actions that the CDC recommends in this critical time period.

The CDC website has research-based resources to help health officials as they communicate with the public in the first hours of an emergency. Resources on the

Table 22.4. Communication Actions in the First 48 Hours of an Emergency

Action	Details
Verify the situation	Determine the type, scope, and severity of the event. To get as accurate information as possible, verify each piece of information with more than one source if possible
Conduct notifications	Notify the appropriate organizations and individuals, using the contact list in your communication plan. This should include your organization, stakeholders (including elected officials), and partners. Tell them about the emergency and what actions are being taken. Determine how often the decision-making team will get back together during the day to update each other
Assess the level of crisis	Identify the severity and character of the crisis to help make decisions about hours of operation for communication team, jurisdictions, and other factors
Organize and delegate assignments	Activate the teams identified in the communication plan, including spokespeople. Communication team members may be conducting activities like media interaction, staffing the hotline, updating websites and social media sites, developing information materials, and clearing information for release. Science or medical team members may be defining medical issues and treatments and communicating with health professionals. Various team members may be interacting with emergency responders and law enforcement
Prepare information and obtain approvals	Include information that addresses questions and concerns of stakeholders and information they need to know including protective actions, while expressing empathy and caring
Release information	Try to get each new wave of information out to all audiences, all venues, at the same time in a coordinated way. Methods and audiences can include media/social media, websites, hotlines, employees, partners, legislators and special interest groups, and community members

website at the time of this book's publication included customizable message templates, radio scripts, broadcast media resources in English and Spanish, and fact sheets that can be used by communicators in various emergency scenarios.

The CDC commissioned university research on best practices in communicating about terror threats and other emergencies in the Pre-Event Message Development Project. The universities made recommendations about communication during scenarios such as botulism, pneumonic plague, sarin-type chemical threats, and dirty bombs (Vanderford 2004). Findings that crossed all the areas that messaging should address the following factors:

- The nature of the threat
- How to detect exposure and symptoms
- How to protect themselves by avoiding or reducing exposure
- When to seek medical attention
- How to treat symptoms that have already appeared
- The potential for long-term health effects
- Progress in apprehending the perpetrators

Researchers made these recommendations:

- Ensure that the media and local authorities are continually informed and prepared to speak.
- Use well-known, well-respected public figures and subject matter experts to address issues on protective actions and health.
- Develop message materials that answer the key questions stated earlier, provide clear action steps, are clear and easily understood, include sources for credibility, and reflect full government disclosure.
- Use an information dissemination plan to ensure that critical information will be available when people need it and where they look.

In addition, a nationwide study to develop a model for how people decide to take emergency preparedness actions found that people were more likely to act when given "dense information." Dense information was defined as consistent information from all communicators (federal, state, and local government; nongovernmental organizations and nonprofit organizations) that comes through many different communication methods and repeats over time. Repetition was the key to getting people to take action (Wood et al. 2012).

We've all heard of situations when people dismiss urgent warnings and alerts, such as telling residents to evacuate before a hurricane or flood reaches them. Research about weather-related warnings (NOAA Social Science Committee 2016) has shown that people are more likely to respond to alerts when they:

- Come through official or familiar sources
- Are delivered in person

- Are delivered through multiple sources and channels
- Are specific, credible, certain, relayed more often, and consistent
- Provide guidance on specific actions to be taken
- Say who the message is from
- Describe the likely impacts of the coming event
- Identify geographical impact areas
- Note when the alert expires/updates
- Are short, between 90–140 characters

Remember that during an event, it is your responsibility to communicate. If the public misunderstands, you bear the responsibility to adapt methods or messages to get critical points across. Lessons learned from emergencies in recent years also suggest the following:

- **Be prepared to counter the desire to downplay the risk.** Research and actual disasters have demonstrated the tendency for people to feel safer than warranted, even when told to evacuate their homes. This was shown to be true in earthquake-prone Bucharest, Romania, as well as after a major flood in Switzerland (Armas 2006; Siegrist and Gutscher 2008). It has also happened with several hurricanes in the United States in recent years.
- **Adapt communication messages and materials as needed.** After Hurricane Katrina in 2005, the CDC created special communications for people in evacuation centers, including topics such as handling stress to prevent bullying, shaken baby syndrome, suicide, and sexual abuse. The CDC also created a set of “playing cards” in various languages containing simple, illustrated prevention messages on topics such as stress and relationships, parenting under stress, preventing violence, and rape prevention.
- **Realize that one of the biggest issues is control.** Nobody wants to feel like a victim, even vicariously. To help people regain some sense of control, give them something to do. This “something” needs to be positive (“do this,” rather than “don’t do that”), actionable (they know what to do and when they have accomplished it), and real (no placebos). One of the frustrating things for Americans following the September 11 attacks was the call from the nation’s leaders to “be vigilant.” While positive, it was difficult to implement and thus not satisfying as a personal response.
- **Remember that transparency and process still matter.** In stakeholder involvement, the process of communicating risk has often been just as important to the success of the effort as the actual risk communication product. This fact is proving even more so for emergency situations. Jennifer Leaning of the Harvard School of Public Health looked at ethical issues for public-health-related terrorist events and found that the integrity of the search for answers was just as important as the answers themselves (Leaning 2003).

- **Include the individual as well as the group.** Leaning also found that although public health practitioners are taught to seek the greatest good for the greatest number, the needs of individuals in emergencies cannot be ignored. Leaning also stresses attention to psychological distress (Leaning 2003).

The following sections provide additional advice on communicating during an emergency, including communicating from an emergency operations center, working with the news media, answering public questions, and supporting a family assistance center.

Emergency Operation Centers

An emergency operation center, which may include or be called a joint information center, is activated in an emergency to distribute consistent and accurate information. More and more, these centers are run according to the incident command structure mentioned earlier. In a public health emergency such as SARS, such centers have the following communication responsibilities (CDC 2003):

- Issue local public health announcements and updated information on the outbreak and the response.
- Disseminate information about the crisis, its management, and the possible need for travel restrictions, isolation, and quarantine.
- Establish a news desk operation to coordinate and manage media relations and social media activities.
- Provide a location for state, local, and federal communication and emergency response personnel to meet and work side by side in developing key messages, handling media inquiries, writing media advisories and briefing documents, and monitoring social media.
- Respond to frequently occurring questions by developing fact sheets, talking points (key messages), and question-and-answer documents.
- Coordinate requests for spokespersons and subject matter experts.
- Issue media credentials.
- Address other local/regional information requests related to the outbreak that require distribution to the media and the public.
- Develop, coordinate, and manage local websites and social media, as required.

Such centers may also house the public information hotline and operators (see later in this chapter).

A chemical weapons depot in Oregon created a “Smart Book” that guided operations in its joint information center in case of an emergency. Topics ranged from tips for answering calls to information about agricultural and livestock exposure to steps for sheltering in place.

Those who are charged with communicating risk must understand their role in the structure of an emergency operations center (public information officer, subject-matter expert, gathering and analyzing information, etc.), and provide around-the-clock staff trained in that role. Another role that risk communicators may have to play is in the development of Situation Reports or SITREPs. These concise reports written in nontechnical language provide information on the unfolding situation of the emergency and serve to keep all members of the emergency operations center up to date on activities. Although different situations and incident commanders may require different content, some general topics SITREPs could cover include the following:

- Condition of the affected area
- Characterization of the affected population, including identification of the most seriously affected or most vulnerable groups
- Health conditions, both for people and in the environment
- Main needs, including which are currently covered
- Accomplishments since the last SITREP
- Actions in progress
- Condition of response, whether additional help is needed, and what type of assistance to request (Barrantes et al. 2009)

Working with the Media in an Emergency

TV and radio are important information sources for most people in an emergency, as is social media. Newspapers and other sources of online news remain important, especially for describing the final result of an event and for putting it in context. What can you do to make media interactions as productive as possible? Start by finding a method to coordinate public information personnel from a range of federal, state, and local agencies, working together to respond to media inquiries, writing releases, and providing information on their agencies. If a joint information center is not activated for this, the participants should establish a daily briefing among themselves to coordinate and communicate on media briefings and materials.

What can you do to make media interactions as productive as possible? Start by finding a method to coordinate public information personnel from a range of federal, state, and local agencies, working together to respond to media inquiries and social media posts, writing releases, and providing information on their agencies.

The Emergency Management Laboratory (2001) and Hyer and Covello (2005) have several suggestions to accommodate reporters on the scene of an accident or disaster. First, try to make sure that they have access to the resources necessary to do their jobs:

- Ample electrical power
- Sufficient light for auditorium and meeting space
- Sufficient space for speakers, cameras, lights, and microphones
- Internet access for filing stories electronically and posting to social media
- Access to high-quality graphics
- Access to parking near the scene
- Arrangements with local police/city agencies to block off congested streets or areas

Consider the timing of news conferences. Because of deadlines, the best time to hold a media event may be around 10:00–11:00 am on a weekday morning or 3:00–4:00 pm on a weekday afternoon, though this may vary by country or locality. If possible, plan around competing events that may prevent journalists from attending. For fast-breaking emergencies, consider holding at least two news conferences per day, thereby allowing the spokesperson to gather and share more information.

Recognize that the media will seek certain information and behave in a certain way during an emergency. They tend to:

- Search for background information
- Dispatch reporters/resources to the scene (may include local and national coverage)
- Get access to the site or spokesperson
- Dramatize the situation (which includes looking for the most dramatic video or photo possible)
- Expect an instant briefing, complete with written information
- Find immediate victims and other affected people
- Find filler for stories if credible information is not available, using sources such as nearby residents and volunteer rescue workers

TV, radio, and web-based media usually have faster deadlines than print media. They can go with very brief information at the beginning and do not need to wait to have a more thorough story before distributing it. These media outlets might need just the basics within 30 minutes, and more later. Thus, in an emergency, organizations need to be thinking

> When you release your own bad news, you decrease the likelihood of rumor, supposition, half-truths, and misinformation.
> —Kathleen Fearn-Banks (1996, p. 65)

about “what’s good enough for now” instead of waiting 2 hours to respond with a full description of the incident.

Be prepared to answer the following questions:

- What happened and where?
- Who was affected and how?
- What is the extent of damage?
- What caused the problem?
- Who is to blame?
- Has anyone broken the law?
- Has this ever happened before?
- Is there danger now?
- What else can go wrong?
- What are you doing about it?
- How can we find out more?

For emergencies involving disease outbreaks, Hyer and Covello (2005) list dozens of likely media questions that can be prepared for in advance, such as the following:

- How contagious is it, and how is it spread?
- Can people be vaccinated or otherwise be treated, and how effective are those treatments?
- How will medicines be distributed, and is there an adequate supply?
- What are the symptoms of the disease, and what should people do if they think they’ve been exposed?
- Who is in charge, and how are you coordinating with other organizations?
- Is this caused by terrorism?
- What is being done to stop the disease?
- What kinds of medical care are available, and what happens if facilities are overcome by demand?
- How many people could get sick or die?
- What are you recommending for your own family?
- Is any quarantine or isolation necessary, and if so, how will that work?

The CDC makes the following recommendations about working with media during an emergency:

- Have staff assigned to answer calls before you release information.
- Put media info out via blast fax, newswire, phone, briefing, website, and appropriate social media channels.

- Set up a media command post where the media can consolidate information to deliver to their audiences.
- Have areas for TV media to do their “stand-ups.” If this is at your site, it will usually be where the building displays your organization’s logo.
- Let the media know when updates will be given. Give them as promised, even if there is nothing new to say.
- Distribute a copy of any official statements and a fact sheet on the situation and the organization.

When conducting a news conference, personnel involved in handling the emergency, spokespersons, and technical advisors should agree on the following before the news conference:

- What information is most important?
- Who will speak for what specific issues?
- What are the key messages?
- What questions are likely to arise?
- What visuals could be used?
- Who will take notes about any information or resources that need to be followed up?

In addition, consider selecting a press room with more than one exit/entry so spokespeople can return to handling the emergency while others speak with the news media (Henry 2000).

During the news conference, each person who speaks should give his or her name, role, and organization represented. With many organizations involved, it helps to have the news conference manager moderate the question-and-answer session by referring the questions to the appropriate person. Tell reporters when the next news conference will occur, if known. Tell them how they can get questions answered in the meantime. After the news conference, continue to monitor media and social media coverage. Debrief with the team to see if any misinformation needs to be corrected later or other changes made for the next interaction.

After the first 48 hours, the public and media will begin to focus harder on why this event happened, what lessons were learned, and what is being done to keep it from happening again.

After the first 48 hours, the public and media will begin to focus harder on why this event happened, what lessons were learned, and what is being done to keep it from happening again. Media competition may intensify to keep the story going with new angles. Monitor the event for new information, monitor media coverage, and continue implementing the plan, making adjustments as necessary. Determine whether the emergency is changing in any way, and address any rumors or points of conflict. Add any new resources needed; relieve staff or return them to normal duties.

Hotlines

One of the most frequently used methods in emergency risk communication is the hotline. Many countries have a single emergency telephone number (sometimes known as the universal emergency telephone number or the emergency services number) that allows a caller to contact local emergency services for assistance. The emergency number differs from country to country; it is typically a three-digit number so that it can be easily remembered and accessed quickly. Some countries have a different emergency number for each of the different emergency services; these often differ only by the last digit.

In many parts of the world, emergency services can identify the telephone number that a call has been placed from. Systems such as Enhanced 911 can provide the address of the cell phone tower that a cell phone is bouncing off of.

Some hotlines are cause-specific. For example, the FEMA helpline offers information about assistance after disasters. The U.S. Substance Abuse and Mental Health Services Administration offers a national crisis counseling and support hotline to people experiencing emotional distress related to natural or human-caused disasters. Trained counselors have helped provide emotional support to people in disasters such as hurricanes, the Boston Marathon bombing, and the Ebola outbreak. The organization connects callers with counselors in more than 150 languages.

Services are available for organizations to set up their own emergency hotlines for specific events. For example, Denver Health worked with regional partners to create concepts for using poison control centers as emergency information hotlines during disasters. Minnesota created the nation's first triage hotline to screen and prescribe antivirals or clinical evaluation to ill callers during the 2009 H1N1 flu virus. In 2015, the Department of Disaster Management Affairs in Malawi set up a free hotline for the public to report on disasters in their areas, to help facilitate quick response.

This single, publicized phone number should be available toll-free to anyone looking for more information. Operators must be available 24 hours a day, although some organizations have found that calls can be serviced by starting with a short, prerecorded message (1 minute or less) that outlines answers to most frequently asked questions. These hotlines must be carefully coordinated with the standard emergency numbers such as 911, because people will likely be calling both.

When planning for an emergency hotline, plan big. During the 1999 West Nile virus outbreak in New York City, hotline staff, 27–75 per shift, answered calls around the clock, fielding a total of more than 150,000 inquiries in 7 weeks (Glass and Schoch-Spana 2002). The 2002 anthrax incident in Palm Beach

County, Florida, saw such an influx of questions to the hotline, by callers who were remarkably well informed, that operators were quickly overwhelmed.

During the 1999 West Nile virus outbreak in New York City, hotline staff, 27–75 per shift, answered calls around the clock, fielding a total of more than 150,000 inquiries in 7 weeks.

Giving hotline employees the answers to frequently asked questions, prepared in advance, is one way to help them field calls more efficiently. People typically ask the following basic questions:

- What happened?
- Where is it?
- Who is/will be affected, and how?
- What is being done?
- What can I do?
- How long will it last?
- Will it happen again?
- Who was at fault?

In the case of communicable diseases, people also want to know whether it is contagious and how, who is at risk, whether there is treatment or a cure, whether it is spreading, and when it will end (Green et al. 2007). People may also want to know how to keep from getting the disease.

The following categories suggested by the CDC may be helpful for organizing responses to questions, especially where public health is involved:

- Information about the event or threat
- Tip line, with actions people can take to protect themselves and others
- Reassurance/counseling
- Referral information for health care workers
- Referral information for epidemiologists or others to report cases
- Lab/treatment protocols

In developing responses in advance, consider people's mental models. Understanding what people do not know and what misperceptions they have helps you provide accurate information and counter rumors. When the Allegheny County Department of Health in Pennsylvania was dealing with the flood of anthrax-related calls in 2001, they realized that people did not know they had to be exposed to be at risk. Risk communication researcher Baruch Fischhoff helped them develop a model of the probability of anthrax exposure that could be used to design risk communications. The model included concepts such as exposure route, dose, anthrax strain, vaccination status, and health status of recipient (CDC 2003).

Monitor your hotline for midcourse corrections. A simple response form, such as a shared database, can be used to record questions asked and responses given. Reviews of these responses will reveal whether correct and adequate information is given, new information is needed, and any patterns exist to the questions. Necessary corrections can be shared with hotline staff and in subsequent media interactions.

COMMUNICATING AFTER AN EMERGENCY

After an emergency, communicators should help move stakeholders to resolution and recovery, improve future public response, and learn from experience.

Risk communication does not stop when the emergency does. One example of the importance of effective postemergency response was described by the commission that investigated the 2011 Fukushima nuclear plant disaster. Even a year after the disaster, residents in the affected area were still struggling from the effects of the accident (The National Diet of Japan 2012). They continued to face grave concerns, including the health effects of radiation exposure, displacement, the dissolution of families, disruption of their lives and lifestyles, and the contamination of vast areas of the environment. “The government has yet to address the impact of radiation on the health of residents,” the report said. “The government has not seriously undertaken programs to help people understand the situation well enough to make their own behavioral judgments. Although [radiation exposure] standards have been categorized in detail, it is more important that the government communicates in ways that are clearly helpful to the public: identifying what is edible, what is the tolerable intake level, which foods continue to be safe, and whether tests are reliable.”

Information needs vary depending on how much time has elapsed since the emergency. The CDC recommends a phased message approach for communicating after large storms, for example (Table 22.5).

When the emergency situation stabilizes, the work of the risk communicator continues. Information is needed to help stakeholders (affected people, the broader public, and the media) move from the emergency situation to resolution and recovery, improve public response to future similar emergencies, and learn from experience. Information is also needed to convey relief and thanks to the response team, evaluate the response effort, and conduct public education.

In the case of mass casualties, one of the more difficult tasks of those communicating risk may be to support the family assistance centers or medical examiner’s/coroner’s offices (Office for Victims of Crime 2001). In its November 2002 OVC Bulletin, the Office for Victims of Crime in the U.S. Department of Justice issued an outstanding template for communities and agencies considering crisis response plans (Blakeney 2002). The report was written by Ray L. Blakeney,

Table 22.5. Phased Message Dissemination for Hurricanes and Floods[a]

Period of dissemination	Topics
Immediately preceding landfall through first 24 hours after the storm	Hurricane readiness, preparation for power outages, preparation related to prescription medications, evacuating the area of a hurricane, staying safe in your home during a hurricane, worker safety in a power outage, carbon monoxide poisoning prevention, flood readiness, electrical safety, prevention of heat-related illnesses, hand hygiene in emergency situations, copying with a traumatic event, emergency wound care, protecting your pets, animals in public evacuation centers
1–3 days after the storm	Reentering your flooded home, how to clean a flooded home safely, worker safety after a flood, preventing chain-saw injuries during tree removal, preventing injuries from falls (ladders/roofs), personal protective equipment and clothing for flood response, managing acute diarrhea after a natural disaster, cleaning and sanitation after an emergency, keeping food and water safe after a natural disaster or power outage
3–7 days after the storm	Protection from animal- and insect-related hazards, electrical safety and generators, infection control and prevention in evacuation centers, impact of power outages on vaccine storage and other medicines, preventing violence after a natural disaster, animal disposal after a disaster
2–4 weeks after the storm	Rodent control after hurricanes and floods, trench foot or immersion foot, environmental health needs and habitability assessments, protection from chemicals released during a natural disaster, respiratory protection for residents reentering previously flooded areas and homes
1 month and after the storm (emphasis is on long-term health consequences)	Suicide prevention, issues surrounding school-age hurricane evacuees attending new schools, mold removal from flooded homes, mold allergies related to flood cleanup

[a] Source: Vanderford et al. (2007).

Director of Operations for the Office of the Chief Medical Examiner of the State of Oklahoma; Blakeney was a key responder to the Oklahoma City bombing and the Oklahoma City tornado of 1999. The bulletin describes lessons learned from mass fatalities on how to provide relief to victims' families. Overarching recommendations include the need for all communities to have an effective crisis response plan and the need for all agency personnel who will interact with families to be trained in communicating effectively, compassionately, and sensitively.

Of particular interest to risk communicators is the list of questions most often asked by families and how to respond. For example:

1. **How will families be notified if their loved ones are recovered and identified?** Responders must identify who will pass on this information and how. While a central point of contact is critical, some organizations such as the police, fire department, and military have their own systems. Families must know who will provide them with accurate information.
2. **What is the condition of the body?** Describing the horrific condition of bodies after an airplane crash or bombing requires compassion, honesty, and tact. Although risk communication advice generally suggests specific language, Blakeney instead suggests more general words like "severe," "significant," and "trauma." Responders should listen to the family and give only the information wanted. Anything more may overwhelm.
3. **How do families know that the information they receive is accurate?** Responders must identify authorized sources of information and make arrangements such as conference calls to relay information to families who would otherwise have to travel to the site. Responders should also provide written information to augment verbal communications, as people under stress have a hard time recalling information.

Those who remain also need risk information. Research has shown that a community is most responsive to risk avoidance and mitigation education directly after a disaster because community members have been sensitized. People want to hear about lessons learned and steps taken to prevent the situation from recurring. People want to be reassured of their safety and attain closure. Particularly in emergencies involving violence such as terrorism or bioterrorism, people need help to deal with the issues.

> A community is most responsive to risk avoidance and mitigation education directly after a disaster.

Example reactions include shock and numbness, intense emotion, fear, guilt, anger and resentment, depression and loneliness, isolation, and panic. Those who live through such attacks may also exhibit physical symptoms like headaches, fatigue, nausea, sleeplessness, loss of sexual feelings, and weight gain or loss. Posttraumatic stress has been recorded even in people in Italy and India who had only viewed television coverage of the 2001 terrorist attacks in the United States (Green et al. 2007). Many people in such situations find it difficult to resume normal activity.

On the other hand, volunteers often come forward looking for ways to help. In Japan after the Fukushima accident, volunteers were decontaminating homes, streets, and schools. In the United States, Gulf state residents volunteered to clean up following the Deepwater Horizon oil spill, only to have their services refused because of liability concerns. After Hurricane Harvey caused massive flooding in southeast Texas in the heat of summer, emergency response organizations pleaded with well-meaning citizens worldwide to donate money for critical supplies and rebuilding, rather than sending useless items such as winter coats, prom dresses, and food that required refrigeration. These lessons and others like them show that it is important to communicate how volunteers can safely and effectively be incorporated into disaster recovery efforts.

Some ways that risk communicators can help include the following:

- Make counselors, clergy members, and other survivors available to talk to those having difficulty coping.
- Be ready to answer questions about types of assistance, payment for travel and other expenses, and how to query insurance companies.
- Remember children, who are often overlooked in times of crisis.
- Give volunteers specific opportunities to help others, and point them to reputable organizations whose personnel are working on the ground.

CHECKLIST FOR EMERGENCY RISK COMMUNICATION

Before an emergency:

☐ Organizations and individuals responsible for responding, reporting, and other activities have been identified.
☐ Those who will need to receive information have been identified.
☐ Vulnerable populations and their needs have been identified.
☐ An emergency communication plan has been prepared and shared with stakeholders.
☐ Exercises and/or drills have been implemented and plans adjusted accordingly.
☐ Background information has been prepared (for example, maps, description of organizational roles in an emergency, and website/social media content including contact information).

During an emergency:

☐ Emergency operations centers and/or hotlines are activated, if appropriate.
☐ The risk communication plan is implemented, with messages and materials adapted as necessary as the emergency unfolds.

After an emergency:

- ☐ Victims' families are communicated with, in partnership with other organizations as appropriate.
- ☐ Phased messages are conveyed that align with evolving risks and concerns as time passes.
- ☐ Lessons learned and ways to prevent or mitigate similar emergencies in the future have been conveyed.
- ☐ The emergency risk communication plan has been updated to reflect lessons learned and new information.

REFERENCES

Armas, I. 2006. "Earthquake Risk Perception in Bucharest, Romania." *Risk Analysis*, 26 (5), 1223–1234.

Barrantes, S.A., M. Rodriguez, and R. Perez. 2009. *"Information Management and Communication in Emergencies and Disasters."* Pan American Health Organization, Regional Office of the World Health Organization, Washington, DC.

Blakeney, R.L. 2002. "Providing Relief to Families after a Mass Fatality: Roles of the Medical Examiner's Office and the Family Assistance Center." OVC Bulletin, November. https://www.ncjrs.gov/ovc_archives/bulletins/prfmf_11_2001/188912.pdf (accessed October 26, 2017).

CDC (Centers for Disease Control and Prevention). 2003. "Severe Acute Respiratory Syndrome (SARS)." http://www.cdc.gov/sars/index.html (accessed October 26, 2017).

CDC (Centers for Disease Control and Prevent). 2009. *The Risk Communicator*, Issue 3.

Center for Biosecurity of UPMC. 2012. "After Fukushima: Managing the Consequences of a Radiological Release." Baltimore, Maryland.

Chess, C., K. L. Salomone, B. J. Hance, and A. Saville. 1995. "Results of a National Symposium on Risk Communication: Next Steps for Government Agencies." *Risk Analysis*, 15 (2): 115–125.

Cordasco, K.M., D.P. Eisenman, D.C. Glik, J.F. Golden, and S.M. Asch. 2007. "'They Blew the Levee': Distrust of Authorities Among Hurricane Katrina Evacuees." *Journal of Health Care for the Poor and Underserved*, 18, 277–282.

Covello, V.T., D.B. McCallum, and M.T. Pavlova. 1989. "Principles and Guidelines for Improving Risk Communication." V.T. Covello, D.B. McCallum, and M.T. Pavlova, eds., *Effective Risk Communication: The Role and Responsibility of Government and Nongovernment Organizations*. Plenum Press, New York, pp. 3–16.

Covello, V.T., R.G. Peters, J.G. Wojtecki, and R.C. Hyde. 2001. "Risk Communication, the West Nile Virus Epidemic, and Bioterrorism: Responding to the Communication Challenges Posed by the Intentional or Unintentional Release of a Pathogen in an Urban Setting." *Journal of Urban Health: Bulletin of the New York Academy of Medicine*, 78 (2), 382–391.

Cuite, C. and R. Morss. 2017. “What to Tell People to Get Them to Evacuate Before a Hurricane Hits.” Washington Post, September 8. https://www.washingtonpost.com/outlook/what-to-tell-people-to-get-them-to-evacuate-before-a-hurricane-hits/2017/09/08/09b1efc0-93e0-11e7-8754-d478688d23b4_story.html (accessed January 29, 2018.)

DesRoches, C.M. 2003. “Opinion Surveys and Risk Communication,” quoting the Harvard School of Public Health/Robert Wood Johnson Foundation Survey Project on Americans’ Response to Biological Terrorism, October 24–28, 2001. Harvard School of Public Health presentation to the Maine Institute for Public Health.

Eisenman, D.P., K.M. Cordasco, S. Asch, J.F. Golden, and D. Glik. 2007. “Disaster Planning and Risk Communication with Vulnerable Communities: Lessons from Hurricane Katrina.” *American Journal of Public Health*, 97 (S1), S109–S115.

Emergency Management Laboratory. 2001. “Emergency Public Information Pocket Guide.” Oak Ridge Institute for Science and Education, Oak Ridge, Tennessee. http://orise.orau.gov/emi/epi/files/epi-booklet.pdf (accessed February 7, 2013).

Fearn-Banks, K. 1996. *Crisis Communications: A Casebook Approach*. Lawrence Erlbaum Associates, Mahwah, New Jersey.

Fischhoff, B. 2002. Remarks delivered at the 27th Annual AAAS Colloquium on Science and Technology Policy on April 11–12, 2002, Washington, DC.

GAO (Government Accountability Office). 2011. *Influenza Pandemic: Lessons from the H1N1 Pandemic Should Be Included into Future Planning*, GAO-11-632, Government Accountability Office, Washington, DC.

George, A.M. 2012. “The Phases of Crisis Communications.” A.M. George and C.B. Pratt, eds., *Case Studies in Crisis Communication: International Perspectives on Hits and Misses*. Routledge, New York.

Glass, T. A. and M. Schoch-Spana. 2002. “Bioterrorism and the People: How to Vaccinate a City Against Panic.” *Chemical Infectious Diseases*, 34: 217–223.

Green, M., J. Zenilman, D. Cohen, I. Wiser, and R. Balicer. 2007. *Risk Assessment and Risk Communication Strategies in Bioterrorism Preparedness*, NATO Security Through Science Series-A: Chemistry and Biology. Springer, Dordrecht, The Netherlands.

Greenberg, J. 2016. “Several Weeks Since the Zika Threat Exploded onto the Global Mediascape We May Not Be Any Closer to Understanding the Risk.” Policy Options. February 16. http://policyoptions.irpp.org/2016/02/16/zika/ (accessed September 4, 2017).

Henry, R. 2000. *You’d Better Have a Hose If You Want to Put Out the Fire: The Complete Guide to Crisis and Risk Communications*. Gollywobbler Productions, Windsor, California.

Hoffman, R.E. 2003. “Preparing for a Bioterrorist Attack: Legal and Administrative Strategies.” *Emerging Infectious Diseases*, 9 (2), 1–11.

Homeland Security News Wire. 2017. “‘Social Media Triangulation’ to Help Emergency Responders.” July 21. News Wire Publications, LLC, Mineola, New York. http://www.homelandsecuritynewswire.com/dr20170721-social-media-triangulation-to-help-emergency-responders?page=0,0 (accessed August 13, 2017).

Hyer, R.N. and V.T. Covello. 2005. *“Effective Media Communication During Public Health Emergencies: A WHO Handbook.”* WHO/DCS/2005.31. World Health Organization, Geneva, Switzerland.

Internet World Stats. 2017. “World Internet Usage and Population Statistics.” June 30. http://www.internetworldstats.com/stats.htm (accessed September 4, 2017).

Kennedy, M. 2016. “Independent Investigators: State Officials Mostly to Blame for Flint Water Crisis.” Northwest Public Radio. March 23. http://www.npr.org/sections/thetwo-way/2016/03/23/471585633/independent-investigators-state-officials-mostly-to-blame-for-flint-water-crisis (accessed August 13, 2017).

Lapowsky, I. 2017. “Harvey Shows Progress on Emergency Communications Since Katrina.” Wired. August 29. https://www.wired.com/story/harvey-shows-progress-on-emergency-communications-since-katrina/ (accessed September 4, 2017).

Leaning, J. 2003. “Bioterrorism and Public Health: The Ethics of Public Health Practice in Crisis Settings.” Harvard School of Public Health, Harvard Medical School, presentation to the Maine Institute for Public Health.

McKay, J. 2015. “Ebola Response Provides Key Lessons for Risk Communications.” Emergency Management, January 13. http://www.govtech.com/em/health/Ebola-Response-Provides-Lessons-Risk-Communications.html (accessed September 4, 2017).

Moon, S., et al. 2015. “Will Ebola Change the Game? Ten Essential Reforms Before the Next Pandemic. The Report of the Harvard-LSHTM Independent Panel on the Global Response to Ebola.” *The Lancet*, 386 10009 2204–2221.

National Research Council. 2003. *The Internet under Crisis Conditions: Learning from September 11*. The National Academy Press, Washington, DC.

National Oceanic and Atmospheric Administration Social Science Committee. 2016. “Risk Communication and Behavior: Best Practices and Research Findings.” Washington, DC.

Office for Victims of Crime. 2001. *OVC Handbook for Coping after Terrorism*, September 2001. NCJ 190249, Office for Victims of Crime, Office of Justice Programs, U.S. Department of Justice, Washington, DC.

Office of Public Health Preparedness and Response, Centers for Disease Control and Prevention, Department of Health and Human Services. n.d. “Public Health Workbook to Define, Locate, and Reach Special, Vulnerable, and At-risk Populations in an Emergency,” CS211575A. https://emergency.cdc.gov/workbook/pdf/ph_workbookfinal.pdf (October 26, 2017).

Parkin, R., L. Ragain, R. Bruhl, H. Deutsch, and P. Wilborne-Davis. 2008. “Advancing Collaborations for Water-Related Health Risk Communication.” Jointly published by the American Water Works Association Research Foundation, American Water Works Association, and IWA Publishing, Denver, Colorado.

Pew Research Center. 2017. “Internet/Broad Band Fact Sheet.” January 12. http://www.pewinternet.org/fact-sheet/internet-broadband/ (accessed September 4, 2017).

Rathi, A. 2016. “The WHO Botched Ebola—But It’s Winning Praise for Handling the Terrifying Zika Epidemic.” Quartz Media LLC. February 4. https://qz.com/618286/the-world-health-organization-deserves-a-rare-applause-for-its-handling-of-the-terrifying-zika-epidemic/ (accessed September 4, 2017).

Regional Disaster Preparedness Organization. 2013a. PACE Setter 2013 Exercise Planning Process Evaluation. https://www.portlandoregon.gov/rdpo/article/474311 (accessed August 13, 2017).

Regional Disaster Preparedness Organization. 2013b. PACE Setter 2013 Full-Scale Exercise After Action Report/Improvement Plan. https://www.portlandoregon.gov/rdpo/article/463542 (accessed August 13, 2017).

Revkin, A.C. 2011. "As Irene Approaches, So Does Challenge of Heeding Warnings About Rare Threats." DotEarth, August 26, The New York Times blog. http://dotearth.blogs.nytimes.com/2011/08/26/as-irene-approaches-so-does-challenge-of-heeding-warnings-about-rare-threats/ (accessed October 26, 2017).

Substance Abuse and Mental Health Services Administration. 2017. "Greater Impact: How Disasters Affect People of Low Socioeconomic Status," July, Disaster Technical Assistance Center Supplemental Research Bulletin. https://www.samhsa.gov/sites/default/files/programs_campaigns/dtac/srb-low-ses.pdf?platform=hootsuite (accessed September 4, 2017).

Siegrist, M. and H. Gutscher. 2008. "Natural Hazards and Motivation for Mitigation Behavior: People Cannot Predict the Affect Evoked by a Severe Flood." *Risk Analysis*, 28 (3): 771–778.

Shaw, A. 2017. "Apps, Textbots, & Web Maps: Tech Ecosystem Aids Harvey Relief Effort." Xconomy, August 30. http://www.xconomy.com/texas/2017/08/30/apps-textbots-web-maps-tech-ecosystem-aids-harvey-relief-effort/ (accessed September 3, 2017).

Slovic, P. 1999. "Trust, Emotion, Sex, Politics, and Science: Surveying the Risk-Assessment Battlefield." *Risk Analysis*, 19 (4): 689–701.

Solymossy, D.S. 2013. "High-Tech, Low-Tech, No-Tech: Communications Strategies During Blackouts." Naval Postgraduate School, Dudley Knox Library, Thesis and Dissertation Collection, Monterey, California. https://calhoun.nps.edu/handle/10945/39020 (accessed September 4, 2017).

The National Diet of Japan. 2012. The Official Report of the Fukushima Nuclear Accident Independent Investigation Commission. http://www.nirs.org/fukushima/naiic_report.pdf (accessed October 26, 2017).

Thomas, C. W. 1998. "Maintaining and Restoring Public Trust in Government Agencies and Their Employees." *Administration and Society*, 30 (2): 166–193.

U.S. Department of Homeland Security. 2017. "Best Practices for Incorporating Social Media into Exercises." Social Media Working Group for Emergency Services and Disaster Management and DHS S&T First Responders Group. https://www.dhs.gov/sites/default/files/publications/Best-Practices-Incorporating-Social-Media-Into-Exercises-508%20.pdf (accessed August 13, 2017).

Vanderford, M.L. 2004. "Breaking New Ground in WMD Risk Communication: The Pre-Event Message Development Project." *Biosecurity and Bioterrorism: Biodefense Strategy, Practice, and Science*, 2 (3), 193–194.

Vanderford, M. L., T. Nastoff, J. L. Telfer, and S. E. Bonzo. 2007. "Emergency Communication Challenges in Response to Hurricane Katrina: Lessons from the Centers for Disease Control and Prevention." *Journal of Applied Communication Research*, 35 (1): 9–25.

Wood, M. M., D. S. Mileti, M. Kano, M. M. Kelley, R. Regan, and L. B. Bourque. 2012. "Communicating Actionable Risk for Terrorism and Other Hazards." *Risk Analysis*, 32 (4): 601–615.

Wray, R., J. Rivers, A. Whitworth, K. Jupka, and B. Clements. 2006. “Public Perceptions About Trust in Emergency Risk Communication: Qualitative Research Findings.” *International Journal of Mass Emergencies and Disasters*, 24 (1): 45–75.

ADDITIONAL RESOURCES

Agency for Toxic Substances and Disease Registry. http://www.atsdr.cdc.gov (accessed October 26, 2017).

Alexander, D. 2013. “Social Media in Disaster Risk Reduction and Crisis Management.” *Science and Engineering Ethics*, 20, 717–733.

Association for Professionals in Infection Control and Epidemiology. http://www.apic.org (accessed October 26, 2017).

Association of State and Territorial Health Officials. 2002. “Communication in Risk Situations: Responding to the Communication Challenges Posed by Bio-Terrorism and Emerging Infectious Diseases.” Washington, DC.

California Governor’s Office of Emergency Services. 2001. *“Risk Communication Guide for State and Local Agencies.”* Office of Emergency Services, Sacramento, California.

Canadian Centre for Emergency Preparedness. http://www.ceep.ca/ (accessed October 26, 2017).

Coombs, W.T. and S.J. Holladay (Eds). 2010. *The Handbook of Crisis Communication*. Wiley-Blackwell, West Sussex, UK.

Federal Emergency Management Agency. http://www.fema.gov (accessed October 26, 2017).

New York State Health Department. “How to Create Effective Health Message for People with Disabilities.” https://www.health.ny.gov/publications/0957/ (accessed October 26, 2017).

Reynolds, B., and M. Seeger. 2014. Crisis and Emergency Risk Communication, 2014 edition. https://emergency.cdc.gov/cerc/index.asp (accessed July 24, 2017).

Stuver, P. 2006. “Maximizing Emergency Communication.” *Risk Management*, 53 (5): 30–34.

U.S. Department of Health and Human Services. 2002. “Communicating in a Crisis: Risk Communication Guidelines for Public Officials.” Substance Abuse and Mental Health Services Administration, Rockville, Maryland. http://www.orau.gov/cdcynergy/erc/content/activeinformation/resources/HHSRiskCommPrimer.pdf (accessed October 22, 2017).

U.S. Department of Homeland Security, Ready.gov. http://www.ready.gov (accessed October 22, 2017).

“Wilson Center’s Science and Technology Innovation Program.” Woodrow Wilson International Center for Scholars, Washington, DC. https://www.wilsoncenter.org/program/science-and-technology-innovation-program (accessed October 26, 2017).

23

INTERNATIONAL RISK COMMUNICATION

Risk communication is a global phenomenon. Many countries have their own distinguished risk communication researchers, practitioners, and advisors from universities, governments, and the private sector. Institutions such as the World Health Organization (WHO), the Organisation for Economic Co-Operation and Development, and the International Labour Organization have missions that address and communicate global risks. The United Nations, European Chemicals Agency, and other intergovernmental bodies form agreements and set standards on issues such as climate change and worker safety. In this increasingly connected world, people are seeking risk communication best practices that they can apply in their own countries and situations, or across countries. In fact, people from more than 20 countries have used previous editions of this book.

Why the rise in international risk communication? Some risks, such as foodborne illnesses, start in one country but travel rapidly around the world. And risk communication travels just as quickly. People use social media to report on earthquakes and other disasters literally while they are happening.

Risk Communication: A Handbook for Communicating Environmental, Safety, and Health Risks, Sixth Edition. Regina E. Lundgren and Andrea H. McMakin.
© 2018 The Institute of Electrical and Electronics Engineers, Inc., and Regina E. Lundgren and Andrea H. McMakin. Published 2018 by John Wiley & Sons, Inc.

> Some risks, such as foodborne illnesses, start in one country but travel rapidly around the world. And risk communication travels just as quickly.

In our shrinking world, countries are looking to each other for communication strategies that have proven useful. For example, nine countries in Southwest and Central Asia, in one of the most seismically active areas of the world, joined in 2003 to share risk and knowledge-management strategies for emergency preparedness and recovery. U.S. officials sought flood control advice from the Netherlands, a country mostly under sea level, after Hurricane Katrina struck the United States in 2005. And Japan shared best practices with Armenia, Kyrgyzstan, and Tajikistan in 2016 on disaster preparedness and resilience.

Specific strategies for international risk communication appear throughout this book, in the appropriate sections. In addition, however, we offer these broad principles for communicating risks in counties outside the United States. Most are drawn from published research and case studies, or highly publicized events. One important caution: International risk communication is complicated by many factors, and this section merely touches the surface. To plan risk communication strategies for individual countries, be sure to consult experts from those locations and review country-specific research.

RECOGNIZE THE SIMILARITIES

Do not immediately assume that risk communication is wildly different worldwide. Many of the constraints, ethical issues, general principles, planning steps, and actions described in this book hold true regardless of the geographic area or whether you are conducting care, consensus, or crisis communication. For example, people everywhere may become angry when a risk is mishandled or not communicated properly. Parents of children who died in poorly built schools in the 2008 earthquake in Sichuan, China, expressed the same kind of outrage as Louisiana residents who had no way to evacuate after Hurricane Katrina struck.

The same is true for planning. Residents who live in high-danger coastal areas all need to understand what to do in case of a violent storm, whether their country calls it a hurricane, typhoon, or cyclone. And the responsible stakeholders, whether government officials, private aid groups, or media, need to know exactly how to respond in the emergency.

Start with key principles, but investigate further to ensure that they will work for your audience. Customize your activities accordingly. Look for multicountry guidance on particular risk situations as well. For example, the WHO (2005) has published a guide to effective media communication during public health emergencies. The International Atomic Energy Agency can provide good background materials on nuclear risks.

Case Study: Disease Outbreaks Show Importance of Risk Communication

When the mosquito-borne Zika virus outbreak became apparent in 2015 and began spreading rapidly, governments in the affected countries approached risk communication in different ways, some commendable and others not. Two examples follow.

Singapore received a commendation in 2016 from the WHO for efficiently tracking and containing the outbreak and demonstrating high levels of transparency in the process. In May 2016, when the first case was confirmed in Singapore, the health ministry almost immediately began informing the public through traditional and social media channels to connect with citizens one-on-one, allay fears and anxieties, and convey strategies that people could use to protect themselves.

The Government of India, in contrast, informed WHO about three cases of Zika months after they were confirmed in 2017, saying that the situation had not reached crisis levels. Officials shared information only when approached by the news media instead of reaching out to them as recommended in the India's own National Risk Communication Plan. The municipal commissioner and mayor of the city where the cases were found had not been informed, the public was caught off-guard, and no one answered repeated calls to the Health Services hotline. Consequently, the government suffered attacks by media (e.g., Vijay 2017; The Times of India 2017) and people protested in the streets.

These contrasting approaches show the importance of effective risk communication before and during outbreaks, regardless of the country involved. People need early and ongoing communication and transparency from their government agencies. Information shared should deal with the risks and uncertainties, as well as actions people can take.

ACCOUNT FOR CULTURAL DIFFERENCES

Though some principles are universal, others are not. Each country and population group may have its own characteristics that affect how people perceive and communicate risks. These characteristics may include religious beliefs, health and environmental regulations, and community traditions, all of which can affect how people perceive and respond to risk information.

That culture affects risk communication is not a new concept. Cvetkovich and Earle (1990) described the concept of cultural relativism in risk communication, saying "Culture can provide powerful lenses for seeing through the fog of uncertainty." For example, the commission that investigated the 2011 Fukushima nuclear plant accident blamed the poor disaster response in part to cultural conditions. As the report stated, "What must be admitted—very painfully—is that this was a disaster 'Made in Japan'. Its fundamental causes are to be found in the ingrained conventions of Japanese culture: our reflexive obedience; our

> Each country and population group may have its own characteristics that affect how people perceive and communicate risks. These characteristics may include religious beliefs, health and environmental regulations, and community traditions.

reluctance to question authority; our devotion to 'sticking with the program'; our groupism; and our insularity" (The National Diet of Japan 2012).

Researchers have suggested that risk perceptions in China draw from the Confucian heritage. Researchers have shown that people in Western countries are more likely to judge unknown or less controllable threats as more threatening than others. But Hong Kong Chinese in general judged less familiar threats as less troubling and something that can be thought about with reasonable calmness (Lai and Tao 2003). In that study, the authors explained the difference in part by the Confucian teachings about focusing on this life, not on things that cannot be controlled or understood through personal experience.

Perhaps nowhere is the difference in culture among countries shown than in the roles of women. The Gender and Disaster Network, a virtual international group of researchers and consultants interested in gender relations in disaster contexts, found that risk communication messages were often too general, failing to take into account cultural, age, and gender factors of the community. Risk communicators in other nations also frequently failed to include women and their networks when developing, conducting, and evaluating risk communication efforts (Gender and Disaster Network 2009).

Cultural differences also can mean how governments handle risk communication, and these differences can evolve over time. For example, during the Cold War, Russian scientists visiting a U.S. nuclear site expressed astonishment over the amount of environmental and health monitoring data collected and shared with the local community. "You will only make them afraid!" they warned.

Another example comes from Holland. The Dutch have had a past tradition of being a somewhat paternalistic society. Many local governments argued that it was better to not actively inform citizens about risks in their direct environment because this could lead to irrational fear in their communities. The general opinion was that governments should take appropriate measures and develop plans to protect citizens against risks, but citizens did not have to know about these risks (Meijer 2005). But a deadly 2000 fireworks factory explosion in an urban area changed that. Many citizens were outraged because they had no idea that such a factory existed near them. Dutch government organizations began paying more attention to risk management and communication of risks. In 2004, the government required risk maps for all its provinces—Internet-based maps showing the location of certain hazards in geographic areas. Though some people question whether these kinds of maps could inadvertently help terrorists, the maps caused government officials and companies to be much more transparent about industrial permits that involve hazards.

Some problems occur in more than one country but require very different communication approaches because of cultural and social differences and communication infrastructures. Hundreds of studies have been done on HIV/AIDS communication and prevention worldwide.

Case Study: Respect Cultural Sensitivities About Wording

In this example of care communication, the Centre for Infectious Disease Research in Zambia shared one of its strategies for communicating about a clinical trial to test a microbicide-infused vaginal ring to prevent HIV/AIDS (Robinson et al. 2009).

"Before our community team started to speak openly about our microbicide trial at public meetings, we first needed to apologize for using words not considered 'polite'. For example, it is not acceptable in our communities for younger women to speak to older women about sex, or for women to speak to men about sex. Yet, the topic of our research related to things that could not be said in mixed company, such as 'vagina' and 'anal sex'. So we had to say 'private parts' for vagina, and pay attention to the cultural rules about what can be said to whom and how. We explained that we needed to use these words so that everyone understood what the research was really about."

Strategies that work in Thailand and India, for example, do not necessarily work in Brazil, the United States, or Africa, but some have proven adaptable for a variety of cultures. Stories, for example, have proven to be a universal way of presenting risk information (Hillier 2006). Noted health educators Rogers and Singhal (2003) describe how "culturally shareable" education/entertainment programs can reduce stigma and promote behaviors that reduce HIV/AIDS transmission.

DREAMS, an organization working toward an AIDS-free future for girls and women in sub-Saharan Africa, funded 55 evidence-based and innovative projects in 2016 as part of an "innovation challenge." Approaches tailored toward cultures in those countries included creating a participatory documentary film and training girls to use it to advocate for their rights; using an early-warning system to help pregnant girls at risk of school dropout; bringing HIV testing, counseling, and male circumcision services to soccer practices for young men; working with popular musicians and celebrities to create consumer-driven demand for antiretroviral medications; and implementing entrepreneurial businesses to deter young women from sex work.

Our advice is simple but essential. Know your audience! Understand the cultural attributes of the areas in which you are communicating and form your strategies around them.

LOOK FOR "YOUR" RISK IN OTHER COUNTRIES

When investigating international communication strategies, it is important to seek countries with social structures that have the most in common with the one you are targeting. In China, where more than two-thirds of men smoke, pregnant women were given skills to ask their men to stop smoking in ways that did not compromise family harmony (Lee 2008). In the United States, researchers designed a more overt approach. The "Not in Mama's Kitchen" campaign targeted African American females, many of whom head households, to reduce second-hand smoke by prohibiting smoking in their homes and cars (Bankston-Lee 2005). And in Russia and Finland, smoking cessation campaigns were based on social competition and positive role models (McAlister et al. 2000). The lesson: the same risk may require different strategies in different countries.

> In China, where more than two-thirds of men smoke, pregnant women were given skills to ask their men to stop smoking in the home in ways that did not compromise family harmony.

Of course, geographic similarity is no guarantee of similar reactions to risk. One study showed that people living in different parts of an urban neighborhood of Beirut, Lebanon, ranked environmental priorities, ranging from air quality to mismanagement of waste containers, differently (Abbas et al. 2006). The researchers attribute this difference to variations in socioeconomic status, locality, health, behavior, and environmental beliefs. They contend that identifying these "divide lines" among priorities can help bring about more inclusive and effective participatory environmental management.

When seeking to communicate risks in one country, it may be helpful to consider other countries that have experienced the same risks. Food quality and safety concerns have long been prominent in certain European countries and Canada, likely because of mad cow disease, the controversy over genetically modified foods, and various food scares in the past decade (De Jonge et al. 2004; French et al. 2005; Leiss and Powell 2005; Lofstedt 2006; Verbeke et al. 2007). Among the risk communication strategies used in Europe to boost consumer confidence are food traceability, food source labeling, and use of the precautionary principle, which states that when there is reasonable suspicion of harm, the lack of scientific certainty or consensus must not be used to postpone preventative action (Aslaksen et al. 2006; van Rijswijk et al. 2008). The International Center of Excellence in Food Risk Communication, started in 2011, publishes a suite of risk communication guides, best practices, and templates related to food health on its website (http://www.foodriskcommunications.org/).

Not surprisingly, countries that are prone to certain disasters typically have strong communication and preparedness in those areas. For example, a robust body of research exists on volcanic crises in Indonesia, the Caribbean, Mexico, and other areas of volcanic activity (for example, De la Cruz-Reyna and Tilling 2008; Haynes et al. 2008; Lavigne et al. 2008). Many researchers have documented the role of cultural, religious, and socioeconomic factors in the willingness, or lack thereof, to evacuate from volcanic danger zones.

> Among the risk communication strategies used in Europe to boost consumer confidence are food traceability, food source labeling, and use of the precautionary principle, which states that when there is reasonable suspicion of harm, the lack of scientific certainty or consensus must not be used to postpone preventative action.

In Ahmedabad, India, a city of 7 million people where air quality is sometimes poor, city officials wanted to find the best way to communicate health risks to its citizens. They looked at best practices on air quality risk communication from Beijing, Los Angeles, Mexico City, and New Delhi. Learning from what others found successful, Ahmedabad city officials launched an air pollution alert system and health risk communication program in 2017 based on real-time data (Langa 2017). Eight air quality monitors collect data on smog and toxic pollutants, generating an air quality index. If the index reaches "very poor," pollution levels and action messages about precautions flash on a dozen LED screens on city roads. Social media platforms and traditional media convey the same messages.

Seek out and learn from the risk communication successes and mistakes of other countries. As many countries have tragically learned, "We know best" and "It can't happen here" attitudes may engender patriotism, but they can make risk consequences worse. More positively, you can often improve and streamline your communication program by learning what others have done, and then adapting it for your situation. For best results, pretest approaches, messages, and materials with your target audiences.

PLAN FOR CROSS-COUNTRY COMMUNICATION

Risk communication becomes more complicated when it crosses borders. Not only have you added cultures and languages, but you also may face competing regulations, political climates, and the need to coordinate organizations that are not necessarily accustomed to working with each other.

Laws about what constitutes a risk, and how to communicate them, vary from country to country. One prominent example is warning labels on tobacco packages. The United States simply requires the use of text-based health warnings, and, as of this writing, U.S. courts have turned down the Food and Drug Administration's request for cigarette companies to include large, graphic warnings on their packaging. But countries that ratified the 2005 World Health Organization tobacco control treaty, known as the Framework Convention on Tobacco Control, go further. They mandate large, graphic health warnings that cover at least 50% of the front and back of the tobacco package. More than 10 countries in North and South America, Asia, the South Pacific, Europe, and the Middle East require picture-based health warnings such as photos of diseased lungs (see examples in Chapter 14).

> Laws about what constitutes a risk, and how to communicate them, vary from country to country.

Another challenge is when governments coexist in a single country. U.S. military bases overseas and Native American lands in the United States are examples of autonomous governments within a country with a different culture. Make sure that you know which regulations apply to your situation and what your audience expects from the risk interaction, particularly in consensus communication efforts.

Sometimes regulations that vary across countries can cause confusion. For example, a 2004 U.S. study found chemicals in farmed salmon. In response, the United States recommended limiting consumption, whereas Canada told its citizens that salmon was perfectly safe. Despite the opposing recommendations, salmon sales dropped worldwide. The reason, two scholars say, is because of the risk communication message (Leiss and Nicol 2006). The U.S. study was a clear and prescriptive narrative that told consumers how much and which type of fish they could safely consume, whereas the Canadian message was much more vague, promising that salmon "does not pose a health risk to consumers, based on Canadian regulations." The authors contend that Health Canada has not done a good job of providing risk information to the public or understanding their perceptions, and that Canadians are not used to trusting the government for food risk issues. Though Health Canada added a new risk communication tool to its website in 2006, which provides warnings about potential health risks, the authors argued that this was not transparent or participatory enough.

Recognizing the cross-border nature of public health threats, more countries are formalizing agreements and coalitions to share information and cooperate on response activities. Risk communicators should inform themselves of any such agreements that may affect their activities.

For example, all member nations of the World Health Organization participate in an international agreement known as International Health Regulations. The agreement sets forth guidelines to monitor, report on, and respond to any events that could pose a threat to international public health, including certain diseases, as well as biological, chemical, radiological, and other threats. Each participating country designates a National Focal Point who is responsible for communications with the World Health Organization. Requirements include providing information-sharing links with health care facilities, national entry points, and other key operational areas, as well as maintaining a national public health emergency response plan. There are time requirements for reporting events and for responding to World Health Organization requests for information.

Building on the North American response to the H1N1 flu pandemic in 2009, Canada, the United States, and Mexico released the "North American Plan for Animal and Pandemic Influenza" in 2012 (U.S. Department of Health and Human Services 2012). The three countries established the policy framework to address not only communication among the relevant authorities but also a faster and more coordinated response to future outbreaks. The agreement describes actions to develop current contact lists, as well as sharing communication strategies and plans, public messaging, best practice strategies, and post-event evaluations. At a more tactical level, the Pan American Health Organization/World Health Organization (2009) created a communication strategy for pandemic influenza.

At least five countries formed the International Center of Excellence in Food Risk Communication in 2011. The organization of global food and health organizations, government agencies, academic institutions, and expert nonprofits was founded to have an international resource of food-specific risk communication materials enabling informed decision making to promote global health. The organization makes online resources available including best practices, guidance, learning modules, and research results. Other types of disasters also engender international cooperation. For example, nations abiding by the World Health Organization's tenants have agreed that all disaster management plans will be consistent.

European Union countries are bound by regulation to inform the general public about the risks of chemicals. To assist its members in this activity, the European Chemicals Agency, a regulatory authority, launched the Risk Communication Network in 2008, which brings together country representatives to communicate with the general public on the safe use of chemicals and the risks of substances. The agency published guidance on communicating information on the risks and safe use of chemicals (European Chemicals Agency 2010). Regulations also require that chemical hazards are clearly communicated to workers and consumers in the European Union through classification and labeling of chemicals.

Multicountry communication, done properly, can be very effective. In 2003, the European Food Safety Authority worked with its partners to communicate findings and recommendations regarding a sensitive issue: a potential carcinogen in baby food (Gassin and Van Geest 2006). The Authority coordinated the communications of its risk assessment findings with the European Commission, national food safety authorities, and other stakeholders to provide European consumers with an accurate and meaningful message. Though the resulting media coverage appeared a bit more alarmist in Great Britain than in other countries, it did not create a controversy or food scare among the public. The authors attribute this to the fact that the effort addressed public concerns and established the European Food Safety Authority as a credible information source.

The European Agency for Safety and Health at Work has run an annual European campaign since 2000, emphasizing a specific workplace issue each year (http://osha.europa.eu/en/campaigns). Topics have included, for example, musculoskeletal disorders, noise, dangerous substances, accident prevention, asbestos, and psychosocial risks. The Agency designs and develops resources for micro-, small- and mid-sized enterprises to help them assess their workplace risks, share knowledge, and apply good practices on safety and health. More than 20 countries participate, receiving campaign toolkits of information materials and other resources in more than 20 languages. Admirably, the agency conducts a wide variety of evaluations to gauge the effectiveness of the campaigns and publishes the results and recommendations on its website.

A situation in 2008 was not handled well, demonstrating the downside of inadequate multicountry risk communication. The chemical melamine was found in milk products in China, sickening thousands of babies and killing some. Once the crisis surfaced, countries began taking actions on their own, testing and yanking Chinese milk products from their shelves. Though the Chinese government launched an investigation, milk producers and government officials came under fire for not communicating about the hazard sooner.

> When a risk emerges in another country, and your organization is responsible for a similar risk in your location, activate your plan to explain what you are doing to prevent the risk and to mitigate it if it does occur.

When communicating across countries, research all applicable laws and regulations that affect the situation. Understand and gain agreement on the roles of all stakeholder organizations. When a risk emerges in another country, and your organization is responsible for a similar risk in your location, activate your plan to explain what you are doing to prevent the risk and to mitigate it if it does occur.

CHECKLIST FOR INTERNATIONAL RISK COMMUNICATION

In communicating risk outside the United States, or across countries:

- ☐ Cultural attributes, including risk perceptions, are identified and accounted for.
- ☐ Successful and less successful risk communication cases have been identified in other countries that have the most in common with those being targeted.
- ☐ Laws and regulations related to risk communication in the targeted countries have been identified.
- ☐ Existing multicountry agreements or coalitions have been integrated into planning.

REFERENCES

Abbas, E., R. Nasrallah, I. Nuwayhid, L. Kai, and J. Makhoul. 2006. “Why Do Neighbors Have Different Environmental Priorities? Analysis of Environmental Risk Perception in a Beirut Neighborhood.” *Risk Analysis*, 26 (2), 423–435.

Aslaksen, I., B. Natvig, and I. Nordal. 2006. “Environmental Risk and the Precautionary Principle: Late Lessons from Early Warnings Applied to Genetically Modified Plants.” *Journal of Risk Research*, 9 (3), 205–224.

Bankston-Lee, K. 2005. “Evolution of Not in Mama’s Kitchen Secondhand Smoke Campaign: The California Experience.” Presentation at the National Conference on Tobacco or Health, May 4–6, 2005, Chicago, Illinois.

Cvetkovich, C.T. and T.C. Earle. 1990. "Risk, Culture, and Psychology." *Cross-Cultural Psychology Bulletin*, 24, 3–10.

De Jonge, J., L. Frewer, H. van Trijp, R. J. Renes, W. de Wit, and J. Timmers. 2004. "The Development of a Monitor for Consumer Confidence in Food Safety: Results of an Exploratory Study." *British Food Journal*, 106, 837–849.

De la Cruz-Reyna, S. and R.I. Tilling. 2008. "Scientific and Public Responses to the Ongoing Volcanic Crisis at Popocatépetl Volcano, Mexico: Importance of an Effective Hazards-Warning System." *Journal of Volcanology and Geothermal Research*, 170, 121–134.

European Chemicals Agency. 2010. "Guidance on the Communication of Information on the Risks and Safe Use of Chemicals." Version 1. ECHA-2010_G-21-EN, Helsinki, Finland. https://echa.europa.eu/documents/10162/23036412/risk_communications_en.pdf/8c0cbe98-bdae-476a-8c6c-1821f71aff9d (accessed October 26, 2017).

French, S., A.J. Maule, and G. Mythen. 2005. "Soft Modelling in Risk Communication and Management: Examples in Handling Food Risk." *Journal of the Operational Research Society*, 56, 879–888.

Gassin, A. and I. Van Geest. 2006. "Communication in Europe on Semicarbazide and Baby Food." *Journal of Risk Research*, 9 (8), 823–832.

Gender and Disaster Network. 2009. Gender Note #5: Women, Gender, and Disaster Risk Communication. Gender and Disaster Network at http://www.gdnonline.org/ (accessed October 26, 2017).

Haynes, H., J. Barclay, and N. Pidgeon. 2008. "Whose Reality Counts? Factors Affecting the Perception of Volcanic Risk." *Journal of Volcanology and Geothermal Research*, 172, 259–272.

Hillier, D. 2006. *Communicating Health Risks to the Public: A Global Perspective*. Gower Publishing, Aldershot, Hampshire, UK.

Langa, M. 2017. "Ahmedabad Launches Air Quality Index Linked to Health Advisories." The Hindu, May 11, 2017. http://www.thehindu.com/news/national/other-states/ahmedabad-launches-air-quality-index-linked-to-health-advisories/article18428207.ece (accessed August 7, 2017).

Lai, J.C. and J. Tao. 2003. "Perception of Environmental Hazards in Hong Kong Chinese." *Risk Analysis*, 23 (4), 669–684.

Lavigne, F., B. De Coster, N. Juvin, F. Flohic, J. Gaillard, P. Texier, J. Morin, and J. Sartohadi. 2008. "People's Behaviour in the Face of Volcanic Hazards: Perspectives from Javanese Communities, Indonesia." *Journal of Volcanology and Geothermal Research*, 172, 273–287.

Lee, A. 2008. "A Pilot Intervention for Pregnant Women in Sichuan, China on Passive Smoking." *Patient Education and Counseling*, 71, 396–401.

Leiss, W. and A. Nicol. 2006. "A Tale of Two Food Risks: BSE and Farmed Salmon in Canada." *Journal of Risk Research*, 9 (8), 891–910.

Leiss, W. and D. Powell. 2005. *Mad Cows and Mother's Milk: The Perils of Poor Risk Communication*, 2nd ed. McGill-Queen's University Press, Montreal, Quebec, Canada.

Lofstedt, R.E. 2006. "How Can We Make Food Risk Communication Better: Where Are We and Where Are We Going?" *Journal of Risk Research*, 9 (8), 869–890.

McAlister, A.L., T. Gumina, E. Urjanheimo, T. Laatikainen, M. Uhanov, R. Oganov, and P. Pekka. 2000. "Promoting Smoking Cessation in Russian Karelia: A 1-year Community-Based Program with Quasi-Experimental Evaluation." *Health Promotion International*, 15 (2), 109–112.

Meijer, A. J. 2005. "Risk Maps on the Internet: Transparency and the Management of Risks." *Information Policy*, 10, 105–113.

Pan American Health Organization/World Health Organization. 2009. "Creating a Communication Strategy for Pandemic Influenza." Washington, DC. http://new.paho.org/hq/dmdocuments/2010/PAHO_CommStrategy_Eng.pdf (accessed October 26, 2017).

Robinson, E.T., D. Baron, L.L. Heise, J. Moffett, and S.V. Harlan. 2009. Communications Handbook for Clinical Trials. Microbicides Media and Communications Initiative, a multipartner collaboration housed at the Global Campaign for Microbicides at PATH in Washington, DC, and by Family Health International in Research Triangle Park, NC.

Rogers, E. M. and A. Singhal. 2003. *Combating AIDS: Communication Strategies in Action*. Sage Publications, New Delhi, India.

The National Diet of Japan. 2012. The Official Report of the Fukushima Nuclear Accident Independent Investigation Commission. https://www.nirs.org/wp-content/uploads/fukushima/naiic_report.pdf (accessed October 26, 2017).

The Times of India. 2017. "Government Still Eerily Silent about Zika." June 1. http://timesofindia.indiatimes.com/city/ahmedabad/govt-still-eerily-silent-about-zika/articleshow/58934636.cms (accessed September 4, 2017).

U.S. Department of Health and Human Services. 2012. "North American Plan for Animal and Pandemic Influenza." Office of the Assistant Secretary for Preparedness and Response, Washington, DC. http://www.phe.gov/Preparedness/international/Documents/napapi.pdf (accessed October 26, 2017).

van Rijswijk, W., L.J. Frewer, D. Menozzi, and G. Faioli. 2008. "Consumer Perceptions of Traceability: A Cross-National Comparison of the Associated Benefits." *Food Quality and Preference*, 19, 452–464.

Verbeke, W., L.J. Frewer, J. Scholderer, and H.F. De Brabander. 2007. "Why Consumers Behave as They Do with Respect to Food Safety and Risk Information." *Analytica Chimica Acta*, 586, 2–7.

Vijaykumar, S. 2017. "Communication Is Key During a Public Health Threat Like Zika and India Has Fallen Short." *Scroll.in*. May 31. https://scroll.in/pulse/839053/communication-is-key-during-a-public-health-threat-like-zika-and-india-has-fallen-short (accessed September 4, 2017).

WHO (World Health Organization). 2005. Effective Media Communication during Public Health Emergencies. http://www.who.int/csr/resources/publications/WHO_CDS_2005_31/en/ (accessed October 26, 2017).

ADDITIONAL RESOURCES

Barrantes, S. A., M. Rodriguez, and R. Perez. 2009. *Information Management and Communication in Emergencies and Disasters*. Pan American Health Organization, Regional Office of the World Health Organization, Washington, DC.

Campaign for Tobacco-Free Kids. http://www.tobaccofreekids.org/index.php (accessed October 26, 2017).

Centers for Disease Control and Prevention Global Health Marketing. http://www.cdc.gov/healthmarketing/ihm.htm (accessed October 26, 2017).

European Chemicals Agency. 2012. "Communication on the Safe Use of Chemicals: Study on the Communication of Information to the General Public." ECHA-12-A-01-EN, Helsinki, Finland. https://echa.europa.eu/documents/10162/13559/clp_study_en.pdf/33dd7bf1-93bc-4d30-8e8d-6f51d838851b (accessed October 26, 2017).

George, A.M. and C.B. Pratt, eds. 2012. *Case Studies in Crisis Communication: International Perspectives on Hits and Misses*. Routledge, New York.

Schwarz, A., M.W. Seeger, and C. Auer, eds. 2016. *The Handbook of International Crisis Communication Research*. John Wiley & Sons, Inc., West Sussex, UK.

Ungar, S. 2008. "Global Bird Flu Communication: Hot Crisis and Media Reassurance." *Science Communication*, 29 (4), 472–497. http://scx.sagepub.com/cgi/content/abstract/29/4/472 (accessed October 26, 2017).

24

PUBLIC HEALTH CAMPAIGNS

Public health campaigns are a specific type of care communication that are almost ubiquitous. They are designed to prompt long-term changes in knowledge, attitudes, behaviors, and, sometimes, public policy. For example, campaigns may encourage people to get their children vaccinated, reduce pesticide use, drive without texting, increase regular exercise, reduce yard-waste burning on high-smog days, know what to do in case of a fire, or handle raw food safely.

Social marketing is another method that is closely related to public health campaigns. Social marketing borrows concepts and techniques from commercial sector marketing, such as customer segmentation and advertising, to promote increases in knowledge, behavior change, and social change. How the “customer” thinks and acts continuously shapes the marketing process.

A large body of research and case studies exists on the design, implementation, and measurement of public health and social marketing campaigns. A sample of these published studies is listed in Additional Resources at the end of this chapter. The wise campaign planner will draw on the lessons of others to make the best use of the significant time and funding necessary for an effective

---

Risk Communication: A Handbook for Communicating Environmental, Safety, and Health Risks,
Sixth Edition. Regina E. Lundgren and Andrea H. McMakin.
© 2018 The Institute of Electrical and Electronics Engineers, Inc., and Regina E. Lundgren
and Andrea H. McMakin. Published 2018 by John Wiley & Sons, Inc.

campaign. Here, we present some guidelines based on research and best practices. Though many of the principles described in this book also apply to public health campaigns, we highlight particular guidelines here that are worth special mention.

UNDERSTAND YOUR GOALS

Understanding the goal of the campaign drives the communication plan, including measurements of effectiveness. Design your campaign to achieve one or more goals such as follows:

- Influencing knowledge and attitudes about a behavior and its consequences
- Changing behavior
- Increasing the visibility of an issue and its importance
- Affecting perceptions of social issues and who is seen as responsible
- Increasing knowledge about solutions
- Affecting criteria used to judge policies and policy makers
- Engaging and mobilizing constituencies to action to develop or change policy

You may wish to set quantifiable objectives. Examples from some campaigns include the following:

- Increase vaccinations by X percent in a certain region.
- Increase the percent of a specific population obtaining cancer screenings by X.
- Increase nonfat and sugar-free drink choices in X school district vending machines by X percent.
- See X number of exercise-tracking apps downloaded.
- Have X percent of people check the "organ donation" box when renewing their drivers' licenses.
- Develop and distribute best practices to prevent hearing loss at work.
- Increase number of referrals from schools to community health organizations by X percent.

Be careful, however, when setting goals in cases where there is no clear health behavior that is best for the group you are targeting. For example, men with elevated prostate-specific antigen test results could decide to have radiation therapy, another treatment, or do nothing. These choices will depend on their values. In this case, the goal would more likely be ensuring that these men understand the risks and benefits of their choices, rather than targeting a specific behavior (Fischhoff et al. 2011).

USE RESEARCH TO DESIGN CAMPAIGNS

Formative research is used to *form* the communication, helping designers choose content, format, and delivery strategies through participatory (user-centered) design (Fischhoff et al. 2011). Formative research emphasizes the target audience's understanding of the risk. Campaign planners have long practiced two kinds of research for message design: (1) research to determine audience predispositions and (2) research to pretest messages and materials for comprehensibility and response.

Some types of formative research include baseline surveys, usability testing, focus groups (Chapter 17), and the mental models approach (Chapters 2 and 9). A research-based approach takes the guesswork out of communication development, especially when the risk communicator is not part of the target audience and thus does not know how the audience thinks. For example, we know one professor whose research showed that wearing seat belts became more important to young men when they learned how their genitalia could be affected in vehicle accidents.

Baseline surveys can be helpful tools for formative research. These surveys are taken before a public health campaign to determine audience perceptions, knowledge, and even willingness to try certain interventions. For example, a mass media campaign in South Carolina was designed to promote public action to reduce abuse of children in families plagued by alcohol or drugs (Andrews et al. 1995). A public survey was conducted 1 year before the campaign to gauge opinions about child abuse and the respondents' likelihood of helping families where present. The results of this survey were used to design specific themes, messages, and materials for the campaign. One of the media forums was a televised talk show, which attracted higher viewership than the regular program, Entertainment Tonight, almost unheard of for a public affairs show. Most encouraging was a 62% increase in the number of people who called a phone service each month for information about how to help abused children.

> Baseline surveys can be helpful tools for formative research.

The World Health Organization (WHO) also does formative research to inform its public health campaigns. In 2015, in preparation for its campaign on reducing antibiotic resistance and "superbugs," WHO conducted a survey of more than 9,000 people in 12 countries. The results showed large percentages of populations who didn't understand the appropriate use of antibiotics and didn't believe they could do much to stop diseases caused by these superbugs. WHO used the findings to develop a multiyear global campaign to raise awareness and encourage best practices among the public, policymakers, and health and agriculture professionals. Key messages included not using antibiotics for colds and flu (for patients), not using antibiotics for growth promotion or to prevent diseases in animals (for the agricultural sector), and reporting antibiotic-resistant infections to surveillance teams (for health professionals) (World Health Organization et al. 2016).

Usability testing is another important aspect of formative research and involves pretesting messages, visuals, and sometimes actions with the intended audience. A good example comes from the Stanford heart disease prevention project, a multicommunity campaign designed to improve cardiovascular health. One of the project's planned messages recommending all-season jogging was modified when it was realized that California winters can be too rainy and jogging paths can be too muddy for the less than highly motivated runners (Rogers and Storey 1987). The U.S. Environmental Protection Agency presumably did not pretest its advertisement to alert Americans to radon gas in the home, where children were shown turning into skeletons after they were exposed to radon (Moore 1997). The ad created such a protest that it was canceled.

For ideas about how to research your audiences and their perceptions of the issues, see Chapter 8.

USE MULTIPLE METHODS TO REACH PEOPLE

In general, to raise awareness in an audience about a particular health risk or motivate them to take some action, audience members need to receive the information more than once. Different audiences also look for health information in different places, and various members may have varying learning styles. Given all that, it is important to use several channels, such as the news media, paid placements, independent coverage, online venues, and social media, to ensure that your information is reaching those at risk.

News Media

More exposure means more opportunities to reach people. Base your selection of media channels on your audience analysis. Understand your community's media access points—where and how certain topics are covered in various media channels (Wallack et al. 1993). Consider going beyond traditional news programming. Television, for example, has magazine news shows, public affairs programming, and free speech or editorial announcements. Health topics may fit well with the lifestyle, financial, and business sections of newspapers as well as editorial content. Radio has talk shows, editorials, and public service announcements.

Remember that certain channels and formats are accessible only to some segments of the community. For example, in a campaign to lower cardiovascular disease in two California communities, public health experts found that a regular newspaper column on health was read by some members of the community and not others (Fortmann et al. 1995). In contrast, the child abuse prevention campaign in South Carolina, mentioned earlier, used an effective combination of media delivery channels and other formats. People heard about the problem of child abuse through television, billboards, posters, and print publications. After public service announcements were broadcast, people were invited to call a toll-free number for help or information.

A multimedia project directed at reducing teen pregnancy in the Ohio area used paid airtime on radio, supplemented by public service announcements in other media. People could call a hotline number for information and appointments. The campaign reached 80% of teens in Columbus over 7 weeks, resulting in 1000 calls per month at its peak (Taplin 1981).

The M.D. Cancer Center in Houston ran a campaign to reduce sun exposure behavior in several large cities in Texas from 1990 through 1992. In addition to radio and TV interviews, public service announcements in English and Spanish, and press conferences, the campaign also used 1-minute segments on six children's TV shows, live radio interviews with listener call-ins, and "Day at the Dome" baseball game publicity that included ticket giveaways on the radio before the game. The campaign reached more than 1 million people in three cities and resulted in a significant increase in people saying that they had taken actions to reduce the risk of skin cancer (Gelb et al. 1994).

Paid Placements and Independent Coverage

Media messages associated with public health issues can be either paid or independent. Paid placements, such as television and radio spots, enable you to control the content of the message, the audience it reaches, and its timing. The success of the effort is more easily measured because the audience is receiving a consistent, predetermined message. One disadvantage is that the message can be seen as biased or self-serving, for example, beer distribution companies warning about the dangers of underage drinking. Another disadvantage of mass media advertising is that it can require a large chunk of the campaign budget and may not necessarily target the population most at risk, especially if they do not use the traditional mass media channels.

Health campaign managers can also provide information to the media through press releases and public service announcements. Media representatives then decide whether and how they pass along the information to the public. This is a low- or no-cost option, but with reduced control by the health campaign managers. Campaign planners should know their media gatekeepers' interests and potential conflicts of interest, whether reporters may feel compelled to obtain an opposing point of view, and whether this works to the advantage or disadvantage of the campaign.

Campaign planners should know their media gatekeepers' interests and potential conflicts of interest, whether reporters may feel compelled to obtain an opposing point of view, and whether this works to the advantage or disadvantage of the campaign.

Media outlets also can independently cover a health campaign or the issue the campaign is featuring. Such coverage can create a tremendous support for the issue at hand. *The Alabama Journal*, a regional newspaper, took an advocacy position in a series of stories published in 1987 on state infant mortality. The series focused on real peoples' lives, how Alabama officials had failed to address the issue, the economic and social costs to the state, and what other states had done to reduce the problem. The newspaper sent reprints to 5000 Alabaman opinion leaders, who used them as lobbying tools. Citizens and reporters kept the pressure on the governor and legislators, urging them to take action to reduce the problem. In the 2 years after the series was published, the state legislature instituted several policy changes to combat the problem, and infant mortality rates dropped. Researcher Kim Walsh-Childers (1994) concluded that the newspaper series, which won a Pulitzer Prize, was the critical factor in accelerating public support for policy changes and in creating pressure on legislators to make those changes.

A potential downside of independent coverage is possible inconsistency with the message of a paid campaign. One example is mass media coverage in the 1980s about the connection between aspirin and Reye's syndrome, a potentially fatal illness occurring in children with flu or other viruses (Soumerai et al. 1992). A commonly occurring theme in media coverage was the battle between the consumer groups and the aspirin industry, which was fighting the Food and Drug Administration's proposal for warning labels on aspirin.

Some practitioners use an approach they call media advocacy, wherein community organizations and ad hoc groups work with the media to promote health policies aimed at fundamental social change (Wallack et al. 1993, 1999). This approach can combine the best of paid placement and independent coverage, but it must serve the agendas of all those participating. See Chapter 16 for more information on working with the news media.

Online Interventions and Social Media

Research has found that online health interventions can influence behaviors such as reducing binge drinking, increasing exercise, and managing weight. The advantage of individual online intervention is the relatively low cost and broad reach, with the added motivation of personalization.

Such interventions typically engage individual users in "relationships" that resemble the support offered by dieticians, fitness trainers, and other professionals. The interventions usually inform users about the consequences of their behavior, help them set and achieve goals, teach them skills, and provide pressure to change. Feedback mechanisms are common, with many interventions using tailoring and personalization and offering services to track and report users' progress toward their goals. A review of 30 online interventions yielded the following guidelines (Cugelman et al. 2011):

Online interventions typically engage individual users in "relationships" that resemble the support offered by dieticians, fitness trainers, and other professionals.

- **Blend interpersonal online systems with mass media outreach.** This combination may help individuals achieve personal goals that help them improve the quality of their lives and ultimately lead to healthier societies.
- **Use short interventions to cope with rapid attrition and loss of motivation over time.** Note that this recommendation may be less applicable to demanding change processes, such as tobacco cessation or weight loss.
- **Design goals strategically.** Design interventions around goals that appeal to the target audience while offering tailored support to help participants who may lack motivation or ability.
- **Use adherence systems.** For example, consider having the system e-mail or text users with a reminder message if they do not log into the system within a certain time period.

One caution when using electronic systems with individual users is to ensure consent and confidentiality. Particularly with health-related information, participants on both ends need documented ways to ensure that they have agreed to who has access to personal information and how it is protected.

The use of social media is gaining importance in public health campaigns. The U.S. Centers for Disease Control and Prevention (CDC) has developed several integrated social media campaigns, targeting topics including health protection after natural disasters, sexual health, and annual seasonal flu vaccinations. CDC created a variety of embeddable tools that partners can use to share information, including audio podcasts, video, eCards, and text messages. Tools with portable content, such as widgets and online video, enable users to share messages and become health advocates. See Chapter 19, Social Media, in this book for more information on using social media to communicate risks.

Other Methods

For many years, risk communicators relied on the mass media as the primary method of spreading information about public health risks. Research on public health campaigns, however, shows that the mass media are not necessarily the most credible for changing attitudes and behaviors (Rogers and Storey 1987). For the greatest chance of success, the message must be reinforced through other communication channels such as opinion leaders and community groups.

The SmokeFree Resource Centre of the United Kingdom's National Health Service has had success with face-to-face events such as in shopping centers with phone follow-up; a Facebook page that brings together an online community of smokers, ex-smokers, and National Health Service advisers; and extensive resources for midwives and employers. An antialcohol abuse campaign targeting Michigan State University students used media interviews and public service announcements, flyers, e-mails to college students, letters to alcohol vendors, theater troops, and alcohol-free events (Witte et al. 2001).

The WHO's and CDC's public health campaigns typically use a multitude of channels and products in various languages including posters, infographics, videos, online quizzes, radio scripts, podcasts, and social media. Messages and approaches vary by type of demographic roles such as health professionals, parents, people living with disease, victims of natural disasters, policymakers, and so on.

Case Study: Creative Campaign Draws Blood

How do you motivate people to do something that inconveniences them but helps others? And how do you get their attention in the first place?

The National Health Service's Blood and Transplant organization is known for its creative and effective communications to encourage people to donate blood and register as organ donors. To launch its award-winning 2012 campaign, the organization painted peoples' bodies with realistic-looking hearts and blood vessels, called "body artery." These painted people walked around London to raise awareness of the need for donors of all blood types, directing people to make an appointment online or by phone to give blood. Recipients of life-saving blood transfusions also appeared with the donors to simulate the transfer of the life-giving blood from one arm to another.

A video of the painted donors generated 264 pieces of mainstream coverage, involving all of the main TV news channels, and prompted an immediate public response. In a single day, 30,000 people visited blood.co.uk, and calls from potential donors increased by 29% (Alonso 2015).

Interpersonal communication has been shown to play a crucial role in changing strongly held attitudes and motivating behavior change. The Stanford heart health campaign used community leaders and support groups to disseminate information and to persuade by example (Kim 1985).

In another example, the National Health Services wanted to encourage more black citizens to give blood. Only 1% of people who give blood in England are black, yet 40,000 more black donors were needed to meet a growing demand for a special subtype of blood more common in black people afflicted with sickle cell disease. The agency partnered with black Christian churches across England to speak with their congregations with the message of saving lives through blood donation. The campaign included sermon and prayer resources for churches, testimonials by pastors and a Christian rap artist, and a #blackbloodmatters social media hashtag (NSH 2017).

For more information on risk communication partnerships, see Chapter 20.

Case Study: Food Risk Communication Offers Recipe

When the UK's Food Standards Agency wanted to get people to reduce their salt intake in foods, it didn't just target consumers. In a 2004–2009 campaign, the agency also worked with the UK food industry and health organizations to encourage product reformulation (European Food Safety Authority 2012).

Borrowing a term from business, you might call this risk communication approach "vertical integration." Significantly, all sectors of the food industry—retailers, manufacturers, trade associations, caterers, and suppliers to the catering industry—supported the salt awareness message, responding positively to calls to reduce salt in foods and continuing to engage other stakeholder groups.

The campaign messages emphasized the health risks and actions to be taken. When the campaign began, adults were consuming on average 9.5 g of salt per day. Toward the end of the campaign, adults were consuming on average 8.6 g of salt—not quite the 6 g per day goal, but still a significant reduction. The number of consumers cutting down on salt had increased by around one-third, and the number of consumers trying to cut down on salt by checking labels had doubled.

WHEN THINGS GO WRONG

Communicators in public health campaigns can face resistance, misinformation, and other barriers to success. Learning from others can be useful, as the following examples show.

Don't Blame or Vilify

What do you do in public health campaigns where the action being encouraged is controversial, such as vaccinating your child? Try not blaming "refusers" for bad behavior.

In 2015, a measles outbreak in the United States spread in 14 states. It provoked a rising vilification of parents who refuse to vaccinate their children. Media and social media have called parents selfish by placing the safety of their children over everyone else's. Nonvaccinating parents have been threatened with legal action, and some doctors are dismissing those children from their practices.

Risk expert and author David Roepik, an instructor at the Harvard Extension School, argues that while not defending that choice, we should realize that vilification makes vaccine doubters dig in and become even more determined to hold their positions (Ropeik 2015).

Why does this happen? It's the psychological tendency called disconfirmation bias, according to Dr. Brendan Nyhan of Dartmouth University (NBC News 2015). "Information we don't want to hear, we try very hard to reject it. That is especially true for beliefs that are central to our identity," he said.

Parents are doing what they think is best for their kids, and calling them uninformed or stupid is counterproductive, say these experts. A better approach is to emphasize the protection of their children through immunization. Offer information from a trustworthy source, specifically and respectfully responding to the reasons why nonvaccinating parents feel the way they do.

Counter Misinformation in Disease Outbreaks

During infectious disease outbreaks, messages are often distorted and misinterpreted for various reasons, including information gaps, uncertainties, and even "dueling experts." In the past, risk communication during outbreaks sometimes ignored misinformation, relying instead on official reassurance ("We're the experts"), followed by sanctions for noncompliant individuals (quarantine, stigmatization).

The rise of social media exacerbated the flow of misinformation during outbreaks. A multiyear, multicountry project issued a guide called New Communication Strategies for Preventing Misinformation" (2014)". It was based on population behaviors and lessons learned during major epidemics and pandemics. Key recommendations included the following:

- Focus on presenting educational messages that increase awareness, promoting actions "to prevent" rather than "to control."
- Keep providing current information on the status of the outbreak, signs and symptoms, transmission, and protective measures. Provide updates about uncertainties and any differences in opinions expressed by public health experts.
- Establish a 24/7 "inquiry point" for journalists to verify information or rumors that circulate online.
- Systematically monitor social media, the web, and other online platforms to detect misinformation or rumors that spread. Try to identify the source or the origins of misinformation and correct it immediately.
- Use posts and user comments in social media platforms to identify public concerns, fears, and popular misconceptions about the outbreak, and address them in your risk communication messages.
- Meet with editors and other media representatives to develop a common understanding around what messages are vital to transmit to the public.
- Tell people where they can find reliable health information and how to judge its accuracy.

Case Study: What Do You Do When Your Clinical Trial Fails?

Risk communicators must respond carefully yet quickly when a clinical trial must be closed unexpectedly because of scientific futility or concerns for the participants' safety. In 2007, a clinical trial in India and Africa to test a microbicide gel to prevent HIV infection was closed prematurely because of a higher number of HIV infections in the study group (Robinson et al. 2009). The clinical trial managers had to communicate that unexpected and unwelcome development.

The following communication strategies worked well:

- Negotiating with the U.S. Security and Exchange Commission directly for a 24-hour delay in release of the sponsor's press release on the business wire
- Opting against holding a press conference, and instead contacting a few trusted health journalists respected for writing balanced and accurate stories
- Intensely monitoring the media and correcting inaccuracies (Today, this would also include social media.)
- Collaborating with the wider field through the Microbicides Media and Communication Initiative—a field-wide collaborative effort to coordinate communication issues across prevention trials
- Coordinating the press releases of the research groups and the product developer

The clinical trial team shared the following lessons learned:

- Contextualize the situation. Use local HIV prevalence and incidence estimates among people both within and outside of the trial to paint a picture of the trial communities and countries.
- Specify the numbers of individuals affected (such as the number of women who became infected during the trial) in statements.
- Coordinate closely with all trial sites in the area and ensure they have communications support on the ground.
- Mind the time zones. Schedule strategy and urgent response calls at times amenable to in-country staff and those most in need of support.

EVALUATE SUCCESS

In evaluating public health campaigns, researchers typically attempt to measure one or more of the attributes shown in Table 24.1. Formative evaluation, discussed earlier, can help create a targeted risk communication campaign. Process evaluation can improve and document its delivery, and outcome/impact evaluation can quantify its effects. Campaign managers should evaluate the effort partway through, if possible, to make any necessary midcourse corrections.

An important caution is to measure the desired outcome, such as behavior or knowledge, as directly as possible. Self-reported attitudes or intentions to act are notoriously unreliable because they may be based on a desire to help the researcher, or to appear well intentioned.

Table 24.1. Evaluation in Public Health Campaigns[a]

Evaluation type	Definition/purpose	Example questions
Formative	Assesses the strengths and weaknesses of campaign materials and strategies before or during the campaign's implementation	How does the campaign's target audience think about the issue? What messages work with what audiences? Who are the best messengers? What actions will the audience be capable of taking?
Process	Measures effort and the direct outputs of campaigns—what and how much was accomplished. Examines the campaign's implementation and how the activities involved are working	How many materials have been put out? How many people have been reached?
Outcome	Measures effect and changes that result from the campaign Assesses outcomes in the target populations or communities that come about as a result of strategies and activities Also measures policy changes	Has there been any affective change (beliefs, attitudes, social norms)? Has there been any behavior change? Have any policies changed?
Impact	Measures community-level change or longer term results that are achieved because of the campaign's aggregate effects on individuals' behavior and the behavior's sustainability Attempts to determine whether the campaign caused the effects	Has the behavior resulted in its intended outcomes (for example, lower cancer rates and less violence in schools)? Has there been any systems-level change?

[a] Adapted from the National Cancer Institute (1992).

The most rigorous outcome evaluations compare the outcomes for a group that was part of a risk communication effort to a group that was not part of it but is otherwise equivalent (Rosen et al. 2006). The strongest design is a randomized controlled trial, with participants randomly assigned to a group receiving the communication or to a control group, making it possible to attribute differences in outcomes to the communication. Of course, sometimes randomized controlled trials are not practical, such as when behaviors are influenced by many uncontrollable factors or budgets are extremely limited. In such cases, a quasi-experimental design can still be useful, such as systematically exploring differences between people who were and were not exposed to the communication. A less rigorous, but typically less costly, outcome evaluation is pre- and post-communication testing: Knowledge or behaviors are measured in the same population before and after the communication campaign.

Evaluation is difficult because many factors other than media coverage contribute to change at the personal and policy level. However, some typical evaluation methods for campaigns are media monitoring, website statistics, ad assessments, case studies, and surveys.

> Self-reported attitudes or intentions to act are notoriously unreliable because they may be based on a desire to help the researcher, or to appear well intentioned.

Case Study: Zombie Campaign Gets Mixed Results

When the U.S. Centers for Disease Control and Prevention (CDC) was looking for a way to draw new attention to emergency preparedness messages in 2011, it broke away from the mundane with a metaphor of a zombie apocalypse to provide a witty yet educational guide. @CDCEmergency blogged and tweeted, "Prepared for a #zombie apocalypse? If so, ur prepared for any emergency. Learn more: CDC Public Health Matters blog http://go.usa.gov/jRH." The campaign quickly went viral, with millions of people viewing the agency's zombie apocalypse blog post and media organizations around the world covering the phenomenon.

Did it work? The answer is: sort of.

CDC wanted to increase awareness and engagement about emergency preparedness, especially among young people—and it certainly did that.

First, awareness. Three days after the "Preparedness 101: Zombie Apocalypse" blog post went live, it was receiving more than 60,000 views an hour, eventually logging more than 5 million views, compared with up to 3,000 views for typical posts on the Public Health Matters blog. The @CDCEmergency feed gained more than 11,000 followers, the CDC's Facebook page gained more than 7,000 fans, and the number of visits to CDC's emergency preparedness website increased by143% in 2011 compared with the previous year. Overall, the campaign generated astounding 3.6 billion impressions from traditional and social media coverage in only a few months (Fraustino and Ma 2015).

Engagement also increased. The post also generated more than a thousand public comments, compared with an average of five comments on other posts on the same blog. The Facebook page sparked approximately 867 interactions in a few days—including likes, posts, and comments. Most of the interactions were positive; some were practical conversations between users about preparedness. To keep the "buzz" going, CDC later augmented the social media campaign with many more zombie-themed educational tactics over the next few months and even years, sometimes collaborating with other federal and commercial partners.

But despite the campaign's reach, it was unclear whether the attention it garnered translated into motivation to prepare for emergencies, knowledge of what to do, and intent to take action. In fact, later research found that people who saw the zombie campaign on social media were actually *less* likely to say that they would take protection actions in comparison to those receiving a traditional, nonhumorous risk message. The campaign's reference to zombies made people significantly less likely to be prepared, make a disaster kit, and have a plan, according to said West Virginia University researcher Julia Fraustino. "If you don't think something's serious, you're not going to prepare for it," she said (Fraustino and Ma 2015).

CDC communicators acknowledged that if they were planning the campaign today, they would focus more heavily on evaluation. The communicators simply were unprepared for such a huge response.

This example reaffirms the importance of conducting baseline research before a public information campaign, identifying action-oriented goals, and evaluating the results afterward.

Lawrence Wallack, professor at the University of California-Berkeley and Director of the Berkeley Media Studies Group, advocates broad avenues of inquiry to assess campaign effects. These avenues include surveying and observing individuals in the target population; examining institutional records of individual behavior; interviewing those who interact with the individuals; and investigating institutional changes in the legal, business, industrial, or education systems. Official statistics, such as drunk driving arrests, sales data, and hospital emergency room data, also can be used as indicators of success (Wallack 1981).

Some of the advice in Chapter 21 may be helpful in evaluating public health campaigns.

CHECKLIST FOR PUBLIC HEALTH CAMPAIGNS

For public health campaigns, ensure that:

- ☐ Campaign goals and objectives are attainable.
- ☐ The campaign has been designed using formative research, including usability testing of information materials.
- ☐ Communication channels have been selected based on audience analysis.
- ☐ More than one communication channel are being used.
- ☐ Online interventions and social media are used appropriately.
- ☐ Misinformation and rumors have been tracked and corrected.
- ☐ The effectiveness of the campaign has been assessed with one or more of these types of evaluation:
  - ☐ Formative
  - ☐ Process
  - ☐ Outcome
  - ☐ Impact
- ☐ The campaign is evaluated for midcourse corrections.
- ☐ Desired outcomes are measured as directly as possible, rather than relying on self-reported attitudes or intentions to act.

REFERENCES

Alonso, F. 2015. "Getting the Public's Attention: Creative Public Health Campaigns." O'Neill Institute for National and Global Health Law, Georgetown University. February 26. http://www.oneillinstituteblog.org/getting-publics-attention-creative-public-health-campaigns/ (accessed September 9, 2017).

Andrews, A.B., D.G. McLees, and S. Curran. 1995. "The Impact of a Media Campaign on Public Action to Help Maltreated Children in Addictive Families." *Child Abuse and Neglect*, 19, 921–932.

Cugelman, B., M. Thelwall, and P. Dawes. 2011. "Online Interventions for Social Marketing Health Behavior Change Campaigns: A Meta-Analysis of Psychological Architectures and Adherence Factors." *Journal of Medical Internet Research*, 13 (1), e17.

European Food Safety Authority. 2012. When Food Is Cooking Up a Storm. www.efsa.europa.eu/riskcomm (accessed August 9, 2017).

Fischhoff, B., N.T. Brewer, and J.S. Downs. 2011. "Communicating Risks and Benefits: An Evidence-Based User's Guide." U.S. Food and Drug Administration, U.S. Department of Health and Human Services, Silver Spring, Maryland. http://www.fda.gov/downloads/AboutFDA/ReportsManualsForms/Reports/UCM268069.pdf (accessed October 26, 2017).

Fortmann, S.P., J.A. Flora, M.A. Winkleby, C. Schooler, C.B. Taylor, and J.W. Farquhar. 1995. "Community Intervention Trials: Reflections on the Stanford Five-City Project Experience." *American Journal of Epidemiology*, 142, 576–586.

Fraustino, J.D. and L. Ma. 2015. "CDC's Use of Social Media and Humor in a Risk Campaign—Preparedness 101: Zombie Apocalypse." *Journal of Applied Communication Research*, 43 (2), 222–241.

Gelb, B.D., W.B. Boutwell, and S. Cummings. 1994. "Using Mass Media Communication for Health Promotion: Results from a Cancer Center Effort." *Hospital and Health Services Administration*, 39 (3), 283–293.

Kim, Y. 1985. Opinion Leadership in a Preventive Health Campaign. Unpublished doctoral dissertation, Stanford University, Stanford, California.

Moore, C.C. 1997. *Haunted Housing: How Toxic Scare Stories Are Spooking the Public Out of House and Home*. Cato Institute, Washington, DC.

National Cancer Institute. 1992. *Making Health Communication Programs Work: A Planner's Guide*. U.S. Department of Health and Human Services, Washington, DC.

NBC News. 2015. "Don't Call Them Dumb: Experts on Fighting the Anti-Vaccine Movement," February 3. http://www.nbcnews.com/storyline/measles-outbreak/dont-call-them-dumb-experts-fighting-anti-vaccine-movement-n298956 (accessed August 11, 2017).

"New Communication Strategies for Preventing Misinformation." 2014. Project co-funded by the European Commission within the 7th Framework Programme: HEALTH theme. ST3.2.4, part of the *Practical Guide for Health Risk Communication*. http://www.tellmeproject.eu/node/390 (accessed August 9, 2017).

NHS (National Health Services). 2017. "Church Campaign Encourages More Black Donors." NHS Blood and Transplant. http://www.nhsbt.nhs.uk/media/news/church-campaign-encourages-more-black-donors/ (accessed September 9, 2017).

Robinson, E.T., D. Baron, L.L. Heise, J. Moffett, and S.V. Harlan. 2009. Communications Handbook for Clinical Trials. Microbicides Media and Communications Initiative, a multi-partner collaboration housed at the Global Campaign for Microbicides at PATH in Washington, DC, and by Family Health International in Research Triangle Park, North Carolina.

Rogers, E.M. and J.D. Storey. 1987. "Communication Campaigns." In C. Berger and S.H. Chaffee, eds., *Handbook of Communication Science*. Sage Publications, Newbury Park, California, pp. 419–445.

Ropeik, D. 2015. "Vilifying Parents Who Don't Vaccinate Their Kids Is Counterproductive." Scientific American guest blog, February 2. https://blogs.scientificamerican.com/guest-blog/vilifying-parents-who-don-t-vaccinate-their-kids-is-counterproductive/ (accessed August 11, 2017).

Rosen, L., O. Manor, D. Engelhard, and D. Zucker. 2006. "In Defense of the Randomized Controlled Trial for Health Promotion Research." *American Journal of Public Health*, 96, 1181–1186.

Soumerai, S.B., D. Ross-Degnan, and J.S. Kahn. 1992. "Effects of Professional and Media Warnings about the Association between Aspirin Use, Children, and Reye's Syndrome." *The Milbank Quarterly*, 70, 155–183.

Taplin, S. 1981. "Family Planning Communication Campaigns." In R. E. Rice and W. J. Paisley, eds., *Public Communication Campaigns*. Sage Publications, Beverly Hills, California, pp. 127–142.

Wallack, L. 1981. "Mass Media Campaigns: The Odds Against Finding Behavior Change." *Health Education Quarterly*, 8, 209–260.

Wallack, L., L. Dorfman, D. Jernigan, and M. Themba. 1993. *Media Advocacy and Public Health: Power for Prevention*. Sage Publications, Newbury Park, California.

Wallack, L., K. Woodruff, L. Dorfman, and I. Diaz. 1999. *News for a Change: An Advocate's Guide to Working with the Media*. Sage Publications, Newbury Park, California.

Walsh-Childers, K. 1994. "A Death in the Family—A Case Study of Newspaper Influence on Health Policy Development." *Journalism Quarterly*, 71, 8220–8829.

Witte, K., G. Meyer, and D. Martell. 2001. *Effective Health Risk Messages: A Step-By-Step Guide*. Sage Publications, Thousand Oaks, California.

World Health Organization, Food and Agriculture Organization of the United Nations, and World Organisation for Animal Health. 2016. World Antibiotics Awareness Week 14–20 November 2016: 2016 Campaign Toolkit. http://www.who.int/campaigns/world-antibiotic-awareness-week/Toolkit2016.pdf?ua=1 (accessed September 9, 2017).

ADDITIONAL RESOURCES

Bennett, P. and K. Calman. 1999. *Risk Communication and Public Health*. Oxford University Press, New York.

Centers for Disease Control and Prevention. 2011. The Health Communicators Social Media Toolkit. Prepared by the Electronic Media Branch, Division of News and Electronic Media, Office of the Associate Director of Communication. https://www

.cdc.gov/socialmedia/tools/guidelines/pdf/socialmediatoolkit_bm.pdf (accessed September 9, 2017).

Coffman, J. 2002. "Public Communication Campaign Evaluation: An Environmental Scan of Challenges, Criticisms, Practice, and Opportunities." Harvard Family Research Project, Cambridge, Massachusetts. Prepared for the Communications Consortium Media Center, Washington, DC. http://www.pointk.org/resources/files/coffman_pub_comm.pdf (accessed November 6, 2017).

Desvousges, W.H. 1991. "Integrating Evaluation: A Seven-Step Process." In A. Fisher, M. Pavlova, and V. Covello, eds., *Evaluation and Effective Risk Communications Workshop Proceedings*, EPA/600/9-90/054. U.S. Environmental Protection Agency, Washington, DC, pp. 119–123.

Desvousges, W.H. and V.K. Smith. 1988. "Focus Groups and Risk Communication: The 'Science' of Listening to Data." *Risk Analysis*, 8 (4), 479–484.

Fischhoff, B. 1989. "Helping the Public Make Health Risk Decisions." In V.T. Covello, D.B. McCallum, and M.T. Pavlova, eds., *Effective Risk Communication: The Role and Responsibility of Government and Nongovernment Organizations*. Plenum Press, New York, pp. 111–116.

Kline, M., C. Chess, and P. Sandman. 1989. *Evaluating Risk Communication Programs: A Catalog of "Quick and Easy" Feedback Methods*. Rutgers University, Cook College, Environmental Communication Research Program, New Brunswick, New Jersey.

Santos, S.L. 1990. "Developing a Risk Communication Strategy." *Management and Operations*, 82 (11), 45–49.

Smith, V.K., W.H. Desvousges, A. Fisher, and F.R. Johnson. 1987. *Communicating Radon Risk Effectively: A Mid-Course Evaluation*. U.S. Environmental Protection Agency, Office of Policy Analysis, Washington, DC.

RESOURCES

The field of risk communication continues to grow. A number of studies have been conducted, articles and books written, and seminars constructed that present information that can be useful to the risk communicator. Some of these resources are listed below. Resources are first grouped topically, by the type of communication (general, environmental, safety, and health) and then by purpose (care, consensus, and crisis communication). References used in the book and additional resources can be found at the end of each section and are only repeated here if they provide more general resource material.

GENERAL RISK COMMUNICATION RESOURCES

Arvai, J., and L. Rivers, III Eds. 2014. *Effective Risk Communication*. Routledge, New York.

Boiarsky, C.R. 2016. *Risk Communication and Miscommunication: Case Studies in Science, Technology, Engineering, Government and Community Organizations*. University Press of Colorado, Boulder, Colorado.

Chess, C., B. J. Hance, and P. M. Sandman. 1989. *Planning Dialogue with Communities: A Risk Communication Workbook*. Rutgers University, Cook College, Environmental Communication Research Program, New Brunswick, New Jersey.

Cho, H., T. Reimer, K.A. McComas, Eds. 2015. *The Sage Handbook of Risk Communication*. Sage Publications, Inc., Thousand Oaks, CA.

Covello, V. T. and F. W. Allen. 1988. *Seven Cardinal Rules for Risk Communication*. OPA-87-020, U.S. Environmental Protection Agency, Washington, DC. http://www.wvdhhr.org/bphtraining/courses/cdcynergy/content/activeinformation/resources/epa_seven_cardinal_rules.pdf (accessed October 14, 2017).

Covello, V. T., P. M. Sandman, and P. Slovic. 1988. *Risk Communication, Risk Statistics, and Risk Comparisons: A Manual for Plant Managers*. Chemical Manufacturers Association, Washington, DC. http://www.psandman.com/articles/cma-0.htm (accessed October 14, 2017).

Risk Communication: A Handbook for Communicating Environmental, Safety, and Health Risks, Sixth Edition. Regina E. Lundgren and Andrea H. McMakin.

© 2018 The Institute of Electrical and Electronics Engineers, Inc., and Regina E. Lundgren and Andrea H. McMakin. Published 2018 by John Wiley & Sons, Inc.

Covello, V. T., D. B. McCallum, and M. T. Pavlova, eds. 1989. *Effective Risk Communication: The Role and Responsibility of Government and Nongovernment Organizations*. Plenum Press, New York.

Fischhoff, B., N. T. Brewer, and J. S. Downs, eds. 2012. *Communicating Risks and Benefits: An Evidence-Based User's Guide*. U.S. Food and Drug Administration. https://www.fda.gov/downloads/AboutFDA/ReportsManualsForms/Reports/UCM268069.pdf (accessed October 14, 2017).

Hance, B. J., C. Chess, and P. M. Sandman. 1988. *Improving Dialogue with Communities: A Risk Communication Manual for Government*. New Jersey Department of Environmental Protection, Division of Science and Research, Trenton, New Jersey.

Hance, B. J., C. Chess, and P. M. Sandman. 1990. *Industry Risk Communication Manual*. CRC Press/Lewis Publishers, Boca Raton, Florida.

Kasperson, R. E. 1986. "Six Propositions on Public Participation and Their Relevance for Risk Communication." *Risk Analysis*, 6: 275–281.

Lundgren, R. E. 2017. Consultant and Trainer in Risk Communication, Public Involvement, and Science and Strategic Communication. http://www.rlriskcom.com for more information (accessed October 26, 2017).

Morgan, M. G., B. Fischhoff, A. Bostrom, and C. J. Atman. 2002. *Risk Communication: A Mental Models Approach*. Cambridge University Press, Cambridge, UK.

National Research Council. 1989. *Improving Risk Communication*. National Academy Press, Washington, DC.

National Research Council. 1996. *Understanding Risk: Informing Decisions in a Democratic Society*. National Academy Press, Washington, DC.

Navy Environmental Health Center. n.d. *Risk Communication Primer: Tools and Techniques*. http://www.med.navy.mil/sites/nmcphc/Documents/policy-and-instruction/nmcphc-risk-communications-primer.pdf (accessed October 14, 2017).

Persensky, J., S. Browde, A. Szabo, L. Peterson, E. Specht, and E. Wright. 2004. *Effective Risk Communication: The Nuclear Regulatory Commission's Guidelines for External Risk Communication*. NUREG/BR-0308, U.S. Nuclear Regulatory Commission, Washington, DC. https://www.nrc.gov/docs/ML0406/ML040690412.pdf (accessed October 14, 2017).

Santos, S. L. 1990. "Developing a Risk Communication Strategy." Management and Operations, November, 45–49.

Society for Risk Analysis. 2017. http://www.sra.org (accessed October 26, 2017).

Tucker, W. T. S. Ferson A. M. Finkel, and D. Slavin, eds., 2008. *Strategies for Risk Communication: Evolution, Evidence, and Experience*, Vol. 1128. Annals of the New York Academy of Sciences, New York.

U.S. Environmental Protection Agency. 2002. *Community Culture and the Environment: A Guide to Understanding a Sense of Place*. EPA 842-B-01-003, Office of Water, Washington, DC.

ENVIRONMENTAL RISK COMMUNICATION RESOURCES

Hance, B. J., C. Chess, and P. M. Sandman. 1988. *Improving Dialogue with Communities: A Risk Communication Manual for Government*. New Jersey Department of Environmental Protection, Division of Science and Research, Trenton, New Jersey.

Hance, B. J., C. Chess, and P. M. Sandman. 1990. *Industry Risk Communication Manual*. CRC Press/Lewis Publishers, Boca Raton, Florida.

Krimsky, S. and A. Plough. 1988. *Environmental Hazards: Communicating Risks as a Social Process*. Auburn House, Dover, Massachusetts.

North American Association for Environmental Education. https://naaee.org/ (accessed October 14 2017).

Sandman, P. M. 1986. *Explaining Environmental Risk*. U.S. Environmental Protection Agency, Office of Toxic Substances, Washington, DC.

U.S. Environmental Protection Agency. 2017. Public Participation. https://www.epa.gov/international-cooperation/public-participation-guide-introduction-public-participation (accessed October 14, 2017).

U.S. Environmental Protection Agency. 2016. *Superfund Community Involvement Handbook*. Washington, D.C. https://semspub.epa.gov/work/HQ/100000070.pdf (accessed October 14, 2017).

U.S. Environmental Protection Agency. 2002. *Community Culture and the Environment: A Guide to Understanding a Sense of Place*. EPA 842-B-01-003, Office of Water, Washington, DC. https://naaee.org/sites/default/files/community_culture.pdf (accessed October 14, 2017).

West, B. M., M.J. Lewis, M. R. Greenberg, D.B. Sachsman, and R.M. Rogers, eds. 2003. *The Reporter's Environmental Handbook*, 3rd edition. Rutgers University Press, Piscataway, New Jersey.

SAFETY RISK COMMUNICATION RESOURCES

National Institute for Occupational Safety and Health. http://www.cdc.gov/niosh/ (accessed October 26, 2017).

National Safety Council. http://www.nsc.org (accessed October 26, 2017).

Occupational Safety and Health Administration. http://www.osha.gov (accessed October 26, 2017).

Society for Risk Analysis. http://www.sra.org (accessed October 26, 2017).

U.S. Department of Labor, Occupational Health and Safety Administration. 2000. *Hazard Communication Guidelines for Compliance*. OSHA 3111, Washington, DC. https://www.osha.gov/Publications/osha3111.pdf (accessed October 14, 2017).

HEALTH RISK COMMUNICATION RESOURCES

Agency for Toxic Substances and Disease Registry. http://www.atsdr.cdc.gov (accessed October 26, 2017).

Agency for Toxic Substances and Disease Registry. n.d. *A Primer on Health Risk Communication Principles and Practices*. http://www.atsdr.cdc.gov/risk/riskprimer/index.html (accessed October 14, 2017).

Baram, M. S. and P. Kenyon. 1986. "Risk Communication and the Law for Chronic Health and Environmental Hazards." *Environmental Professional*, 8 (2): 165–179.

Bennett, P. K. Calman, S. Curtis, and D. Smith, eds. 2010. *Risk Communication and Public Health*, 2nd edition. Oxford University Press, New York.

Centers for Disease Control and Prevention. http://www.cdc.gov (accessed October 26, 2017).

Cohen, A., M. J. Colligan, and P. Berger. 1985. "Psychology in Health Risk Messages for Workers." *Journal of Occupational Medicine*, 27 (8): 543–551.

Fischhoff, B. 1989. "Helping the Public Make Health Risk Decisions. " In V. T. Covello, D. B. McCallum, and M. T. Pavlova, eds., *Effective Risk Communication: The Role and Responsibility of Government and Nongovernment Organizations*. Springer Publishing, New York City, New York, pp. 111–116.

Hyer, R. N. and V. T. Covello. 2005. "Effective Media Communication During Public Health Emergencies: A WHO Handbook." WHO/DCS/2005.31. World Health Organization, Geneva, Switzerland. http://www.who.int/csr/resources/publications/WHO%20MEDIA%20HANDBOOK.pdf (accessed October 14, 2017).

McCallum, D. B. 1995. "Risk Communication: A Tool for Behavior Change." *NIDA Research Monograph*, 155: 65–89.

Office of Public Health Preparedness and Response, Centers for Disease Control and Prevention, Department of Health and Human Services. n.d. "Public Health Workbook to Define, Locate, and Reach Special, Vulnerable, and At-risk Populations in an Emergency." CS211575A. https://emergency.cdc.gov/workbook/pdf/ph_workbookfinal.pdf (accessed October 14, 2017).

Rowel, R., P. Sheikhattari, T. M. Barber, and M. Evans-Holland. 2010. *A Guide to Enhance Grassroots Risk Communication Among Low-Income Populations*. Maryland Department of Health and Mental Hygiene, Baltimore, Maryland. http://serve.mt.gov/wp-content/uploads/2010/10/A-Guide-to-Enhance-Risk-Communication-Among-Low-Income-Populations.pdf (accessed October 14, 2017).

U.S. Department of Health and Human Services, Public Health Service and National Institutes of Health. n.d. *Making Health Communication Programs Work: A Planner's Guide, Revision*. Office of Communications, National Cancer Institute, NIH Publication No. 92-1493, Washington, DC. https://www.cancer.gov/publications/health-communication/pink-book.pdf (accessed October 14, 2017).

Witte, K., G. Meyer, and D. Martell. 2001. *Effective Health Risk Messages: A Step-by-Step Guide*. Sage Publications, Thousand Oaks, California. https://us.sagepub.com/en-us/nam/effective-health-risk-messages/book10703 (accessed October 14, 2017).

World Health Organization. Risk Communication. http://www.who.int/risk-communication/en/ (accessed October 14, 2017).

CARE COMMUNICATION RESOURCES

Agency for Toxic Substances and Disease Registry. 2017. http://www.atsdr.cdc.gov/ (accessed October 26, 2017).

Bennett, P. and K. Calman. 1999. *Risk Communication and Public Health*. Oxford University Press, New York.

Centers for Disease Control and Prevention. 2017. http://www.cdc.gov (accessed October 26, 2017).

Cohen, A., M. J. Colligan, and P. Berger. 1985. “Psychology in Health Risk Messages for Workers.” *Journal of Occupational Medicine*, 27 (8): 543–551.

Levitson, L. C., C. E. Needleman, and M. A. Shapiro. 1997. *Confronting Public Health Risks: A Decision Maker’s Guide*. Sage Publications, Thousand Oaks, California.

Sandman, P. M. 1993. *Responding to Community Outrage: Strategies for Effective Risk Communication*. American Industrial Hygiene Association, Richmond, Virginia. http://www.psandman.com/media/RespondingtoCommunityOutrage.pdf (accessed October 14, 2017).

CONSENSUS COMMUNICATION RESOURCES

Chess, C., B. J. Hance, and P. M. Sandman. 1989. *Planning Dialogue with Communities: A Risk Communication Workbook*. Rutgers University, Cook College, Environmental Communication Research Program, New Brunswick, New Jersey.

Creighton, J. L. and J. W. R. Adams. 2002. *Cyber Meeting: How to Link People and Technology in Your Organization*. Xlibris Corporation, Philadelphia, Pennsylvania.

Flynn, J., P. Slovic, and H. Kunreuther. 2001. *Risk, Media and Stigma: Understanding Public Challenges to Modern Science and Technology*. Earthscan, London.

Hance, B. J., C. Chess, and P. M. Sandman. 1988. *Improving Dialogue with Communities: A Risk Communication Manual for Government*. New Jersey Department of Environmental Protection, Division of Science and Research, Trenton, New Jersey. International Association for Public Participation. https://www.iap2.org/ (accessed October 14, 2017).

Kasperson, R. E. 1986. “Six Propositions on Public Participation and Their Relevance for Risk Communication.” *Risk Analysis*, 6: 275–281.

National Research Council. 1996. *Understanding Risk: Informing Decisions in a Democratic Society*. National Academy Press, Washington, DC. https://www.nap.edu/read/5138/chapter/1 (accessed October 14, 2017).

Ortwin, R. 1992. “Risk Communication: Toward a Rational Discourse with the Public.” *Journal of Hazardous Materials*, 20: 465–519.

Parkin, R., L. Ragain, R. Bruhl, H. Deutsch, and P. Wilborne-Davis. 2008. *Advancing Collaborations for Water-Related Health Risk Communication*. Jointly published by the American Water Works Association Research Foundation, American Water Works Association, and IWA Publishing, Denver, Colorado.

Walker, G. B. and S. E. Daniels. 1997. “Collaborative Public Participation in Environmental Conflict Management: An Introduction to Five Approaches.” *Proceedings of* *the Fourth Biennial Conference on Communication and Environment*, State University of New York-Syracuse, New York.

Wilson, T. 1989. "Interactions Between Community/Local Government and Federal Programs." In V. T. Covello, D. B. McCallum, and M. T. Pavlova, eds., *Effective Risk Communication: The Role and Responsibility of Government and Nongovernment Organizations*. Plenum Press, New York, pp. 77–81.

CRISIS COMMUNICATION RESOURCES

Barrantes, S. A., M. Rodriguez, and R. Perez. 2009. *Information Management and Communication in Emergencies and Disasters*. Pan American Health Organization, Regional Office of the World Health Organization, Washington, DC.

Caernarven-Smith, P. 1993. "Managing a Disaster." *Technical Communication*, 40 (1): 170–172.

Carney, B. 1993. "Communicating Risk." *IABC Communication World*, May:13–15.

Clawson, S. K. Date Unknown. "Crisis Communication Plan: A PR Blueprint." Northern Illinois University, DeKalb, Illinois. http://www.niu.edu/newsplace/crisis.html (accessed October 26, 2017).

George, A. M. and C. B. Pratt, eds. 2012. *Case Studies in Crisis Communication: International Perspectives on Hits and Misses*. Routledge, New York.

Green, M., J. Zenilman, D. Cohen, I. Wiser, and R. Balicer. 2007. *Risk Assessment and Risk Communication Strategies in Bioterrorism Preparedness*, NATO Security Through Science Series-A: Chemistry and Biology. Springer, Dordrecht, The Netherlands.

Heath, R.L. and H.D. O'Hair, eds. 2009. *Handbook of Risk and Crisis Communication*. Routledge, New York, New York.

Henry, R. 2000. *You'd Better Have a Hose if You Want to Put Out the Fire: The Complete Guide to Crisis and Risk Communication*. Gollywobbler Productions, Windsor, California.

Leiss, W. and D. Powell. 2005. *Mad Cows and Mother's Milk: The Perils of Poor Risk Communication*, 2nd edition. McGill-Queen's University Press, Montreal, Quebec, Canada.

Lerbinger, O. 1997. *The Crisis Manager: Facing Risk and Responsibility*. Lawrence Erlbaum Associates, Mahwah, New Jersey.

Littlefield, R. S., and T. L. Sellnow, eds. 2015. *Risk and Crisis Communication: Navigating the Tensions Between Organizations and the Public*. Lexington Books, Lanham, Maryland.

U.S. Centers for Disease Control and Prevention. 2012. *Crisis + Emergency Risk Communication Manual*. https://emergency.cdc.gov/cerc/manual/index.asp (accessed October 14, 2017).

U.S. Council for Energy Awareness. *Annual Crisis Communication Workshop*. 1776 I Street N.W., Suite 400, Washington, DC. 20006-3708, (202) 293-0770.

U.S. Department of Health and Human Services. 2002. *Communicating in a Crisis: Risk Communication Guidelines for Public Officials*. Substance Abuse and Mental Health Services Administration, Rockville, Maryland. https://www.orau.gov/cdcynergy/erc/

content/activeinformation/resources/HHSRiskCommPrimer.pdf (accessed October 14, 2017).

U.S. Department of Homeland Security. 2010. *Risk Lexicon*. https://www.dhs.gov/xlibrary/assets/dhs-risk-lexicon-2010.pdf (accessed October 14, 2017).

U.S. Department of Justice. 2001. *OVC Handbook for Coping After Terrorism*. Office of Justice Programs, Office of Victims of Crime, Washington, DC. https://www.ovc.gov/publications/infores/cat_hndbk/NCJ190249.pdf (accessed October 14, 2017).

World Health Organization. Risk Communication. http://www.who.int/risk-communication/en/ (accessed October 14, 2017).

GLOSSARY

A number of terms in this book may be used differently from standard usage in the field of risk communication. These terms are defined below, as are other terms related to risk communication.

alternative dispute resolution Methods of settling disputes without litigation or administrative adjudication, often involving a neutral third party to solve a disagreement. Methods include facilitation, negotiation, and mediation.

audience Those who may be affected by or perceive that they may be affected by a risk.

bioterrorism The release of a disease-causing substance with the intent to inflict harm and increase fear for political or ideological reasons.

care communication Communicating about a risk for which the risk assessment is completed and the results are accepted by the majority of the audience. This can include communication about industrial hazards and health risks.

community relations Developing a working relationship with the public to determine the acceptable ways of cleaning up a Superfund site. This relationship is mandated by the Comprehensive Environmental Response, Compensation, and Liability Act.

consensus communication Communicating risk to bring a number of groups or individuals to a consensus on how the risk should be managed. Often the extent and nature of the risk is not agreed on by the various groups when the communication effort begins.

crisis A turning point that will decisively determine an outcome, for example, the rupture of a leaking underground storage tank.

crisis communication Communicating risk in the face of a crisis, such as an earthquake or a fire at a chemical plant.

crowdsourcing Obtaining needed services, ideas, or content by soliciting contributions from a large, distributed group of people, especially from the online community, rather than from traditional employees or suppliers.

ecological risk The hazards posed to specific components of the ecological system. This area of risk is getting renewed interest from the U.S.

Risk Communication: A Handbook for Communicating Environmental, Safety, and Health Risks,
Sixth Edition. Regina E. Lundgren and Andrea H. McMakin.
© 2018 The Institute of Electrical and Electronics Engineers, Inc., and Regina E. Lundgren
and Andrea H. McMakin. Published 2018 by John Wiley & Sons, Inc.

Environmental Protection Agency in regard to the Natural Resource Damage Assessments.

emergency Sudden or unforeseen situation that requires immediate action, for example, a terrorist attack.

emergency communication Communicating risk and appropriate responses in the face of an emergency such as a major disease outbreak.

facilitated deliberation A facilitator leads groups of people in discussing common issues and recommending solutions, often for consideration by decision makers. Ranges from online discussion groups to thousands of citizens nationwide.

facilitation A process that uses a facilitator to help groups accomplish their work. The facilitator uses skills and techniques that enable the group to clarify issues, generate ideas, prioritize goals or solutions, and solve problems.

fake news Deliberate misinformation or hoaxes spread via traditional media, social media, or fake news websites, with the intent to mislead for financial or political gain, often with sensationalist, exaggerated, or deliberately false headlines and content that grab attention and increase readership.

hazard Danger; peril; exposure to a situation that could cause loss or injury.

health risk communication Communicating about how to prevent, mitigate, or manage hazards to human health (a kind of care communication).

health risks Hazards to human health, usually from diseases or lifestyle factors.

influencer An individual such as a sports hero, famous actress, pop music star, or well-known scientist to whom an audience looks for and acts on advice.

interactive multimedia Communication methods that give the user some control over the content, format, order of presentation, level of detail, language, delivery speed, sound, and/or other aspects. Sometimes involve conversations or questions and answers. Examples are multimedia CDs, computer-based kiosks, and live web-based seminars.

media see news media

mediation A process that uses a neutral mediator to help people resolve or better manage disputes by reaching agreements about what the parties will do differently in the future. Private caucuses between the parties and the mediator may be used to build support or trust, explore settlement options, or break down barriers to negotiation.

misperception Something a person believes to be related to a risk probability or hazard outcome but that experts agree is irrelevant to the actual probability or outcome.

negotiation A third person helps parties negotiate an agreement, sometimes recommending a particular settlement. The concept of "principled negotiation" rejects a "win–lose" mentality and is instead based on the premise that it is possible to meet one's own needs and those of others, and that conflict provides such opportunities.

news media Mass media channels in which traditional journalists and reporters create the content, including television, newspapers, radio, magazines, online news sites, news blogs, and news apps.

partnership A collaboration with another organization or individual in which each partner both contributes and gains from the effort to communicate risk, while respecting each other's authority, expertise, and reputation.

public People who may or may not be interested in the risk but who are not charged with communicating, assessing, or managing the risk.

public affairs That division of an organization that is charged with the task of developing a positive relationship with the public.

public health campaign A strategic program designed to prompt long-term, health-related changes in knowledge, attitudes, behaviors, and, sometimes, public policy.

public information Information to communicate with the public as opposed to scientists or managers. Because the topic may not be a risk, public information and risk communication materials are not necessarily synonymous. However, most risk communication materials will be sent to the public.

public involvement Involving the public and other interested groups and individuals such as activist groups, community leaders, regulators, and scientists in making some decision. Because the decision may not involve an environmental, safety, or health risk, public involvement is not synonymous with risk communication. The two can, however, overlap.

public participation See public involvement.

public relations The efforts involved in developing a positive relationship with the public, with the goal of getting the public to view your organization in a positive light.

risk Probability of adverse outcome. Risk is inherent in any action, even in inaction.

risk assessment Determining the risks posed by a certain hazard, usually to human health or the environment; can also include legal and financial risk.

risk–benefit analysis Determining and weighing the relative risks and benefits of taking a certain action. It includes determining who receives the risks and benefits.

risk communication The interactive process of exchange of information and opinions among individuals, groups, and institutions concerning a risk or potential risk to human health or the environment. Any risk communication effort must have an interactive component, if only in soliciting information about the audience in the beginning or evaluating success in the end.

risk decision A decision about how to mitigate or prevent a risk.

risk management Evaluating and deciding how to cope with a risk. Risk management may or may not include public participation.

risk message Message that communicates information about the hazard, its probability, the potential outcomes, and actions that can be taken to manage the risk.

risk perceptions The set of beliefs that a person holds regarding a risk, including beliefs about the definition, probability, and outcome of the risk.

social marketing A type of care communication that adapts techniques from mass marketing and advertising to promote increases in knowledge, behavior change, and social change. In public health, social marketing is sometimes called health marketing.

social media A group of interactive, online methods that integrate technology, words, pictures, videos, and audio with the concept of shared content, generated largely by users with easy-to-publish tools.

social networks Websites that enable users to be part of a virtual community, in which they can post profiles, connect with friends, and make new acquaintances based on shared interests. Sometimes considered a subset of social media.

stakeholder Person who holds a "stake," an interest in how a risk is assessed or managed.

stakeholder involvement See stakeholder participation.

stakeholder participation Involving those who hold an interest in the risk or in how the risk is assessed or managed.

technology-assisted communication Technology (electronic forums, mobile platforms, virtual reality, etc.) used as a conduit for risk communication information as opposed to simply a tool to create it.

terrorism An act of violence intended to inflict harm and increase fear for political or ideological reasons.

INDEX

Page numbers followed by *f* denote figures. Page numbers followed by **t** denote tables.

absolute risk *vs.* relative risk, 234–235, 235*f*
acceptability
  of comparisons, 101**t**
  and evaluations, 388–389
  on tours, 250
accident scenarios for hazardous materials, 39
acoustics and speaking engagements, 249
acronyms and abbreviations, 190, 196
action levels, 230–232, 231*f*
actions in response to risk, 189, 405, 438
actual risk, 271–272
Administrative Record, 31
advertisements, 31, 197–198
advertising, audience analysis, 128
advisory groups, 296–297, 307–308**t**, 372–373
advocacy role for news media, 261
alcohol abuse, 478
alerts, 337, 338, 426
  wireless emergency, 149
all-staff electronic messages, 320–321
alternative dispute resolution, 301–305
ambiguity, 62
American Association for the Advancement of Science, 275
American Customer Satisfaction Index, 332
American Institute of Biological Sciences, 83
analogies, 101, 222
analyzing comments and responses, 333–334
Anger, Kent, 317
ANSI Standard No. 2400.1, 38
ANSI Standard Z535.5, 227–229
anthrax, 409, 446
antibiotics, 473–474
apathy, 47–49, 59–60, 289
apple industry and alar, 76
approaches to risk communication, 11–26
approval process, 378
apps for crisis communication, 336–337
Arawa Institute for Environmental Studies, 60
archived data and ethical issues, 80, 81
articles, 199
asymmetry principle, 18
Atmospheric Radiation Measurement Program, 328–329
attire for face-to-face communication, 248, 254
audience, *see also* hostile audience
  communication approaches to, 11–26, 180–182
  communication planning, 113**t**
  comparisons for, 100–104
  confusion, 75
  constraints, 55–63
  emotions, 14, 56–58, 289
  evaluating efforts, 392**t**, 393

Risk Communication: A Handbook for Communicating Environmental, Safety, and Health Risks, Sixth Edition. Regina E. Lundgren and Andrea H. McMakin.

© 2018 The Institute of Electrical and Electronics Engineers, Inc., and Regina E. Lundgren and Andrea H. McMakin. Published 2018 by John Wiley & Sons, Inc.

audience, *see also* hostile audience (*Continued*)
  expectations, 95, 247, 289
  formal hearings, 291
  in risk and technical communication, 2
  information needs, 139–141, 205, 405, 430, 431**t**
  internal management as, 47–49, 79, 177
  laws, 179–180
  listening/responding to, 97
  patronizing approach to, 96, 250–251
  perceptions, 94
  science-phobic attitude assumed, 54–55
  values, 60–61
audience analysis, *see also* pretesting messages
  characteristics, 122–125, 123**t**, 124**t**, 125**t**
  communication plans, 175
  components of an audience, 79
  conducting, 117–133
  crisis communication, 147–149
  health care, 144–147
  incorporating into communication products, 129–131
  information sources, 121, 125–129
  levels of, 119–122, 123**t**, 124**t**, 125**t**
  public health campaigns, 473–474
  visual designs, 205–207
audience interaction, 14
audience needs, 113–114, 170–171
audience participation
  advantages and disadvantages, 73**t**, 307–308**t**
  advertisements for, 31
  CERCLA, 31
  communication methods, 160–161, 161*f*
  conducting, 97, 285–313
  emergency planning and response, 418–420
  evaluating risk communication, 390–391
  vs. face-to-face communication, 156, 242
audience profiles in communication plans, 175
audio news releases, 276
authority, spokespersons, 243

backup tactics, technology-assisted communication, 338
balance in reporting by news media, 265
bar charts, 219–220, 220*f*
Barill, Terryn, 54
baseline audience analysis, 120, 123**t**
Battelle, 182
Beck, Joseph, 70
being the expert, 93
benefits of risks, 137
Bennett, Peter, 388
Berkeley Media Studies Group, 203, 267
bias, unintentional, 234
Blakeney, Ray L., 448–450
blogs, 277, 356, 360–361
blood donors, motivation, 478
body language, 243–244, 248
Boiarsky, Carolyn, 79
booklets, 197
breast cancer, 329
British Petroleum oil spill, 408
Bullard, Robert, 74
Burgman, Mark, 62

calm, deceptive, 59
Calman, Kenneth, 388
campaigns, research, 473–474
Canada, 464
CAN-SPAM Act of 2003, 196
care communication
  apathy, 59–60
  audience analysis, 118–119, 129**t**
  benefits, 137
  communication plans, 174
  definition of, 4, 4*f*
  evaluating risk communication efforts, 391**t**
  message development, 135–151
  news media, 260
  private health records, 39–40
  public health campaigns, 277–278, 471–484
  public service announcements, 277–278
  purpose, 112

  spokespersons, 245
  stakeholder participation, 308**t**
  technology-assisted, 331–332
care communications approaches, 20–23
Carey, Janet, 62
CaringBridge, 350
Carnegie-Mellon University, 20, 71, 100, 103, 205–206, 388
Carpenter, J. Harrison, 395
case study, 19, 93, 94, 139, 178–179, 193–194, 253–254, 288, 337, 364, 366–367, 406, 406–407, 416, 417–418, 419, 428, 436–437, 459, 461, 478, 479, 480–481, 483–484
categorical exclusion reports, 35
caucuses, 303, 304
CAUSE approach, 16–17
CERCLA, *see* Comprehensive Environmental Response, Compensation, and Liability Act
CDC, *see* U.S. Centers for Disease Control and Prevention
CDCynergy, 42
celebrity spokespersons, 78**t**, 245
census data, 128
Center for Health Systems Research and Analysis, 140
certifications, facilitators, 303
certifications, mediators, 304
Certified Professional Facilitator©, 303
CH2M Hill, 335
Challenger explosion, 85, 234
Chambers of Commerce and audience analysis, 128
chartjunk, 234
chemicals, hazardous, 31–34, 37–38, 39, 227
Chess, Caron, 48, 390
child abuse, 473
children, 34
China, 457, 460, 461–462, 466
Chipotle Mexican Grill, 178–179
Chrislip, David, 394
church groups, 418, *see also* volunteer support during an emergency
cigarette warning images, 228*f*
Cision, 275
Citizen Corps, 419–420
Citizens Juries®, 300–301
Clark Atlanta University, 74
Clark, Don, 318
classified information, 81
Clean Air Act Amendments of 1990, 39
climate change, 143, 328–329
clinical trials, failure, 480–481
clothing for face-to-face communication, 248, 254
cocaine epidemic, 232–233, 233*f*
collaboration, 336, 411, 414–415, 479
collaborative campaigns, 479
colors and warning labels, 227
comments
  and responses, 333–334
  and social media, 355
communication methods, 153–166
  emergencies, 420–429, 430
  in communication plan, 177
  incorporating audience analysis, 130**t**
  principles of, 89–105
  public health campaigns, 474–479
communication plans
  community relations, 30–31, 32*f*–33*f*, 127
  developing, 173–184
  outline, 175
communication process approach, 12–13
communication strategy, 179
communications, evacuation, 419
communicators
  audience representative, 73
  constraints, 45–67, 63–65, 83
  evaluating risk communication efforts, 392**t**
  roles, 83
community alerts, 428
Community Culture and the Environment: A Guide to Understanding a Sense of Place, 121
Community Relations in Superfund: A Handbook, 179
community relations plans, 30–31, 32*f*–33*f*, 127
comparisons
  acceptability of, 101**t**
  and risks, 100–104, 213, 271

comprehensive audience analysis, 121, 125**t**
Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 30–31, 127, 179–180, 296
computers in the workplace, 317–320
concept loading, 131
Conclave on Social Media Measurement Standards, 363
cone of uncertainty, 224–225, 224*f*
Confucian heritage, 460
consensus communication
  approach, 23–24
  audience analysis, 118–119, 129**t**
  audience interviews, 254–255
  benefits, 137
  celebrity spokespersons, 245
communication methods, 285–313
  definition of, 5, 4*f*
  evaluating risk communication efforts, 391**t**
  message development, 135–151
  purpose, 112
  risk management, 7, 305–307
  stakeholder participation, 308**t**
  technology-assisted communication, 332–336
conservative, use of the word, 192
consistency in information materials, 196
constraints to risk communication
  defining and solving, 45–67
  emotional, 53–55
  organization communicating risk, 111, 410
  purpose and limits, 90–91
  review procedures, 50–51, 92–93
contact information, 190, 198, 321, 432
contact list, emergencies, 432
contaminant levels and visuals, 210–211
content, social media, 354–355
context
  dependence, 62
  in risk message, 271
control and emergencies, 440
convergence communication approach, 23
coroner's office, 448–450
Council on Environmental Quality, 36
countering misinformation, 480–481
Covello, Vincent T., 17, 18, 93, 107, 144, 243, 269, 377, 418
coverage choices by news media, 264
creative alternatives to high-tech approaches, 427–429
credibility, 331, 332, *see also* hostile audience
  being the expert, 93
  declining in science and industry, 61–62
  emergencies, 407–409, 430
  formal hearings, 289
  hostility and lack of, 56–58
  information release, 92–93
  management support, 160
  risk assessment, 298–299
  spokespersons, 242–243, 249, 250–251, 409
  uncertainty presentation, 223–224
Creighton, James, 70, 180, 299, 305, 336
crises for managers as opportunities for risk communicators, 49
crisis and emergency communication approach, 25
Crisis Commons, 422
crisis communication approaches, 24–26
  original, 24
crisis communication
  audience analysis, 129**t**
  audience needs, 170
  benefits, 137
  communication methods, 286
  definition of, 5, 4*f*
  vs. emergency communication, 401–402
  emotions, 58–59
  evaluating risk communication efforts, 391**t**
  information materials, 321
  message development, 135–151
  news media, 158, 260, 264
  persuasion, 82
  planning, 182–183
  purpose, 112
  risk management, 305
  spokespersons, 268

  stakeholder participation, 308**t**
  strategic planning, 182
  technological assistance, 336–342
crisis map, 425, 426
cross-country communication, 463–466
crowdsourcing, 325, 422–426
cultural differences, 459–461
  and news media, 263–266
cultural relativism, 359–460
cultural sensitivities, respect, 461
culture-appropriate language, 193
cumulative distribution functions, 226, 226*f*
Cvetkovich, George, 18, 194

Dale Carnegie Foundation, 248
The Data Visualisation Catalogue, 209
deadlines, 272–273
  news media, 264–265
dealing with fake news, 279–281
deceptive use of visuals, 232–235
decision making, 334–336
  activities, 299–305, 308**t**
Decision Research (company), 136
decision tools, interactive, 322–323
Defense Environmental Restoration Program, 296
demonstrations, 250–251
denial, 58–59
description-experience gap approach, 22
designing visuals, 155–156
DesRoches, Catherine, 430
Desvousges, William, 395
determining audience for social media, 349–350
Digital Analytics Association, 363
Digital Humanitarian Network, 422
disclaimers, 80
disconfirmation bias, 479–480
discussion forums, 327
disease outbreaks, international, 459
displays, 197–198
dispute resolution, environmental, 304–305
distance education, 318–319
distribution of communication materials, *see also* social media
  media services, 275–276
  newsletters, 195–196
  pamphlets, 197
  posters and signs, 197–198
  videos, 252
diversity and trust, 409
DOD, *see* U.S. Department of Defense
DOE, *see* U.S. Department of Energy
door hangers, 428
downplaying risk, 439–440
Dozier, David, 48, 49, 81, 181–182, 389
draft information and ethical issues, 80
drills, 415–418
dry runs (rehearsals), 248, 251
dueling experts, 265
dueling Ph.D.s, 102
Dunwoody, Sharon, 22

Earle, Tim, 18
Earth System Research Lab, 342
earthquakes, 424
Ebola, lessons learned, 406
economic development organizations and audience analysis, 128
electric and magnetic fields, 143, 204, 206*f*
e-mail, 320–321, 327
emergencies, first 48 hours, 438, 438t
emergency exercise, lessons learned, 416–417
emergency exercise, social media, 417–418
Emergency Management Laboratory, 442–443
Emergency Management Nexus, 342
emergency notification procedures, 31, 337, 426–427
emergency operation centers, 441–442
Emergency Planning and Community Right-to-Know Act, 31–34, 296
emergency planning tool, 339–342
emergency risk communication
  after an event, 448–451
  audience, 401–456
  characteristics, 403**t**-404**t**
  definition, 401–402
  during an event, 436–448

emergency risk communication (*Continued*)
  information availability, 39
  international communication, 460
  managing, 401–456
  planning, 31–34, 409–436
  regulations, 31–34, 39
emotional support, emergencies, 446
emotions
  apathy, 47–49, 59–60, 289
  emergencies, 403**t**-404**t**, 402
  information sources, 12
  mental noise, 17
  outrage, 14, 56–58
  panic, 58–59
  stigma, 63–65, 76
  trust, 18, 407–409
employees, 37–39, 255, 317–320, 411**t**
  communication during emergencies, 411–414
  engagement, 320
engineering notation, 101, 192
environmental
  assessment, 35
  dispute resolution, 304–305
  equity, 34, 74–75
  impact statements, 35–36, 80, 127, 333
  mediation, 304–305
  risk equity, 34, 74–75
Environmental Justice for Minority Populations (Executive Order 12898), 34
Environmental Justice Resource Center, 74
EPA, *see* U.S. Environmental Protection Agency
equipment, speaking engagements, 249
estimates, 102, 192
ethical issues, 69–87, 232–235, 273, 331, 410
EurekAlert!, 275
European Agency for Safety and Health at Work, 465
European Centre for Disease Prevention and Control, 380
European Chemicals Agency, 465
European Food Safety Authority, 377, 465
evacuation communications, 419
evaluation communications, 419
  news media, 274–275
  partnerships, 381
  risk communication efforts, 307–308, 387–398, 481–484, 482**t**
  social media, 362–363
event focus, news media, 263–264
Everyday Democracy, 301
evolutionary theory approach, 20
Executive Orders, 34,
exercises, 415–418
expert models, 141–144, 141*f*, 142*f*
exponents, 192
exposure limits and Occupational Safety and Health Administration, 38
extended parallel process model approach, 21–22

face-to-face communication
  attire for, 248, 254
  conducting, 241–258
  definition of, 156–157
  vs. stakeholder participation, 156, 242
facilitated deliberation, 300–301
facilitation, 302–303
facilitators, 302–303
fact checkers, 279–281
fact checking, 365
fact sheets, 197, 246, *see also* information materials
failure of technology, 338
failure to follow up, 93
fairness and group interactions, 390
fairness of risk, 34, 74–75
fake news, 279–281, 366–367
  social media, 364–367
fam tours (familiarization tours), 267
family assistance centers, 448–450
FAQ, emergencies, 444
Federal Consortium for Virtual Worlds, 342
Federal Emergency Management Agency, 355, 415
Federal Register, 36
Finding of No Significant Impact, 35
Finland, 462

first 48 hours, emergencies, 438, 438**t**
Fischhoff, Baruch, 14, 385, 447
Fisher, Roger, 303
Flint, water crisis, 408
floods, 449**t**
Flynn, James, 18, 64, 76
Focus Group (company), 390
focus groups, 294–295, 307–308**t**
Fog Index, 131
FONSI, *see* Finding of No Significant Impact
food risk, 462, 465
formal hearings, 290–292, 307–308**t**
formative research, 473–474
Forterra, Inc. (company), 340
Framework Convention on Tobacco Control, 463
framing, 136
Freedom of Information Act, 81
frequency, risk communication, 92–93
frequently asked questions, 444
Fugate, Craig, 355
Fukushima, 80, 103, 325, 352, 420, 424, 434, 436–437, 437, 448, 451, 459

Gallup (company), 128
GE training, 320
Gender and Disaster Network, 460
George, Amiso, 357
George Mason University, 16
Giuliani, Rudy, 405
Globally Harmonized System of Classification and Labelling of Chemicals, 227, 228*f*, 229*f*
glossary in information materials, 190
go kits, 433
goals, 472
Google, 338, 350, 354, 362, 365, 366, 420–421
Gore, Albert, 34
government inducements, 40–42
grants, 42
  technical assistance, 296
Gregory, Robin, 63, 76
GridEx, 417
Griffin, Robert J., 22
groundwater contamination, 210–211, 211*f*
group interactions, 293–297
Grunig, James, 48, 181–182
guidelines, social media, 358–359**t**
Gulf oil spill, *see* British Petroleum oil spill

Hager, Peter J., 209
Harris (company), 128
Harvard University, 303, 430, 440
Hayward, Tony, 408
hazard communication program and Occupational Health and Safety Act, 38
Hazard Communication Standard, 37–38, 227
hazard plus outrage approach, 14
hazardous materials
  computer-based tools, 322
  regulations, 37–39
Hazcom, 37–38
health care agencies and audience analysis, 128
Health Insurance Portability and Accountability Act, 39–40
health intervention and technology, 329–330
health messages, 144–147
HealthNewsReviews, 274–275
Health-O-Vision, 329–330
health records, 39–40
heart disease, 220–222, 221*f*, 222*f*, 235*f*, 474
helpful hints sections, 190
Henry, Rene, 269, 432
Hillier, Dawn, 194
HIV and AIDS, 142*f*, 143, 460–461
Holland, 460
honest imbeciles, 223
hostile audience. 288
  causes of, 56–58, 74–75, 91, 247, 319
  communication frequency, 91
  constraints caused by, 56–58
  decision process, 191
  formal hearings, 291–292
  information release, 50–51
  internal management as, 47–49
  listening/responding to, 97

hostile audience (*Continued*)
  ranges to communicate to, 102
  stakeholder participation, 289
  training, 256, 319
hot spots, WiFi, 338–339
hotlines, 446–448
human figures and probability graphics, 219–220, 219*f*
human subjects research, 119–120, 394
Hurricane Harvey, 418, 422, 424, 426
Hurricane Katrina, 409, 435, 440
hurricanes, 224–225, 224*f*, 225*f*, 449**t**

iCANDECIDE, 322–323
idiom, risk, 72–74
illiteracy, 62
images, *see* visual representation of risks
inaccurate or misleading material, 255, 273–274
InciWeb, 338
inclusion and audience interviews, 254
independent coverage, news media, 475–476
indexes, 190
Indians, use of the word, 193
individual risk, 271–272
individuals and groups in emergencies, 441
infant mortality, 476
influencers, 378–381
  approaching, 380
  identifying, 379–380
information fairs, 255
information materials, *see also* writing
  creating, 187–202
  definition of, 153–154
  Executive Order 12898, 34
  speakers bureaus, 249–250
  with face-to-face communication, 246
information needs, 139–141, 205, 405, 430, 431**t**
information processing, 17, 140
information release, 79–81, 92–93, 268
information repository, 31
Information Resources Management College, 341–342
information security, 353
information volume, 318
Institute for Public Policy Research, 300
intellectual property and trade secrets, 51–52
interaction and social media, 355–356
interactive decision tools, 322–323
internal communications in communication plans, 176
International Association for Public Participation, 69, 160–161, 289
International Association of Facilitators, 303
International Food Safety and Quality Network, 327
International Health Regulations, 464
international risk communication, 457–469
international standards, 40–41
internet of things, 324–325
interpersonal communication and public health campaigns, 476–477
interviews
  audience analysis, 125
  by news media, 269
  CERCLA, 31, 179–180
  conducting, 254–255
  evaluating efforts, 394
intranets, 321–322
Israel, 429

Jacobs Institute of Women’s Health, 273
Japan, 459–460
Jefferson Center, 300
job descriptions and audience analysis, 128
job relationships, 113**t**
Johnson and Johnson (company), 62
joint information centers, 441–442
journal articles, 199
journalistic independence, 264–265

Kahlor, LeeAnn, 140
Kasperson, Jean, 14
Kasperson, Roger E., 7, 9, 14, 61, 113
kiosks, 328–331
knowledge base stability, 64–65

ladders, risk, 230–232, 231*f*
language, *see also* writing
  vs. content, 96
  face-to-face communication, 243, 246–247
  for hearing impaired, 250
  information materials, 191–193
  native, translation to, 34, 409
  news media, 271
Larson, Carl, 394
Latino response and Hurricane Katrina, 435
laws
  CERCLA, 30–31, 127, 179–180, 296
  Emergency Planning and Community Right-to-Know Act, 31–34, 296
  evaluating risk communication efforts, 388
  Executive Orders, 34
  explanations and impacts, 29–43
  Health Insurance Portability and Accountability Act, 39–40
  influence purpose and objectives, 110–111
  international communication, 463
  National Environmental Policy Act, 30, 35–36
  Natural Resource Damage Assessment, 36–37
  Occupational Safety and Health Act, 37–39
  Resource Conservation and Recovery Act, 39
  Risk Management Plan Rule, 39
  schedules and, 167
  Superfund Amendment and Reauthorization Act, 30
  warning labels, 227
Leahy, John, 194
Leaning, Jennifer, 440, 441
learning disabilities, 62–63, 154–155
Lebanon, 462
Lefebvre, Craig, 348, 390
legal repercussions, 29–30, 37, 81, 83, 268
legitimacy of representation, 77–78
Leiss, William, 136
lessons learned, Ebola, 406
lessons learned, Zika, 407
Leukemia and Lymphoma Society, 327
lighting and speaking engagements, 248, 249
limitations to risk communication, 45–67, 90–91
list of contacts, 432
listservs, 327
Littlefield, Robert, 25
live online training, 318
local emergency planning committees, 31–34
loudspeakers, 429
low-income populations and environmental equity, 34
low-technology answers, 427–429
Lyme disease, 141*f*

mad cow disease, 89, 136, 408
magnitude of risk, 61, 103–104
malicious compliance, 81
management, risk communicating organization
  as spokespersons, 244
  communication plans, 177
  emotional response, 47–49
  evaluating risk communication efforts, 388, 392**t**
  support, 291, 293, 307
manipulative design, 232–235
mapping, 362
Marquette University, 12, 22
materials, pretesting, 193–194
mathematical formulas, 192
Max Planck Institute of Human Development, 22
McCall, Robert, 270
McCallum, David B., 82, 98, 107
McFadden, Joseph, 191
M.D. Cancer Center, Houston, 475
media advocacy, 476
mediation, 304–305
mediators, 304–305
medical examiner’s office, 448
medication warning labels, 229–230*f*

meeting locations, 31
  audience interviews, 254
  group interactions, 290–291
  showing video presentations, 252
  speaking engagements, 248
membership
  in advisory groups, 297
  in focus groups, 295
  in stakeholder groups, 306
mental models approach, 13–14, 20–21, 141–144, 205
mental noise approach, 17
message
  mapping, 144
  comprehension, 75–76
  content, 96, 188*f*, *see also* writing
  panic, 139
metric units, 190
Mexico, 464
Michigan Technological University, 395
midline audience analysis, 121, 124**t**
minorities, 34, 74–75, 433–436
misinformation, 279–281, 352, 480–481
misinterpretation, 75–76
misunderstanding, 75–76
mobile applications, 324–325
mobile cell sites, 422
mobile devices, 324–325
models, risk communication, 11–26
moderators, 291
monitoring changes in perception, social media, 356–358
moral issues, 69–87, 232–235, 273
Morgan, M. Granger, 20, 21, 55, 71, 141, 143, 205–206, 388
motivating, blood donors, 478
motivation, 478
multimedia programs, 251–254

narrative style, 194–195
National Adult Literacy Survey, 136
National Defense University, 342
National Environmental Policy Act, 30, 35–36, 333, 373
National Hurricane Center, 224–225, 224*f*, 225*f*
National Institutes of Health, 342
National Oceanic and Atmospheric Administration, 342, 371
National Park Service, 334
National Preparedness Report, 416
National Research Council, 13–14, 286, 422
  approach, 13–14
National Resource Center on Advancing Emergency Preparedness for Culturally Diverse Communities, 435
National Resources Defense Fund, 76
Native Americans, use of the words, 193
native language, 34, 243, 246–247
Natural Resource Damage Assessment (NRDA), 36–37
Natural Resource Trustees, 37
negotiated rulemaking, 305
negotiation, 303
negotiators, 303
Nelkin, Dorothy, 265
NEPA, *see* National Environmental Policy Act
Nepal, 424–425
NEPAssist, 333
New York Magazine, 266
newness of risk, 112
news conferences, emergencies, 445
newsgroups, 327, *see also* technology-assisted communication
newsletters, 195–196; *see also* information materials
news media
  advocacy, 475–476
  approval procedures, 159, 264–265
  balance in reporting, 265
  care communication, 260
  as communication method, 158–159
  crisis communication, 158
  emergencies, 432, 442–446
  evaluation of coverage, 274–275
  event focus, 263–264
  inaccurate messages, 273–274
  independent coverage, 475–476
  interviews with, 159, 269
  journalistic articles, 199
  legal repercussions to, 268
  message rehearsal, 149

  misperceptions created by, 18, 64–65
  news media, relationships with, 261, 267–268
  organization support, 159
  vs. other stakeholders, 261–262
  participation levels, 260–261
  public service announcements, 277–278
  working with, 259–283
  writing style, 265–266
nicotine addiction, 213, 215, 215*f*
no comment, 270
no risk concept, 136
nonverbal communication, 243–244, 248
North American standards, 41–42
notifications, emergencies, 426–427
numeracy, 62–63, 136–137

Oak Ridge Institute for Science and Education, 318
objectives and communication products, 109–115, 316–317, 316**t**, 472
objectivity and media, 262
Occupational Safety and Health Act, 37–39
Occupational Safety and Health Administration, 37, 322
off the record, 270
off-the-shelf software, 319–320
Office of Management and Budget, *see* U.S. Office of Management and Budget
OLIVE, 339–341, 340*f*, 341*f*
onion diagram, 180–182, 180*f*
online interventions, 476–477
online news services, 275–276
online training, 318, 320
Operation Topoff, 416
Opinion Research (company), 128
Oregon Health and Science University, 317
organizational barriers to social media adoption, 350–354
organizations communicating risk
  audience interaction, 247–249, 285–313
  constraints from, 46–53, 63–65, 111
  emotional response to, 18
  ethics of, 24, 77–82
  legal compliance, view of, 81–82
  management, 47–49, 79, 177
  roles in emergency, 430
  schedule requirements, 168
  spokespersons acceptability, 244
  Threat Rigidity Response, 48
orientation and visuals, 212, 212*f*
original crisis communication approach, 24
outage, power, 427–429
outrage, 14, 56–58
overcoming barriers to public health campaigns, 479–481

Pacific Northwest National Laboratory, 149, 318
Palmund, I., 113
pamphlets, 197, *see also* information materials
pandemics, 464
panic, 58–59, 139
participatory techniques, 253–254
partnering, *see* partnerships
partnerships
  as communication method, 164–165, 371–381, 435
  in crisis communication, 373
  evaluating, 381
  forms, 372, 372–374, 375**t**,
  guidelines, 374–378
  informal, 374
  required by law, 373–374
Pavlova, Maria, 107
perception, 94
personal communication and trust, 409
personal ethics, 82–85
personalization of risk, 213–214, 265–266
persuasion, 24, 82–83, 255
Peters, Ellen, 136
Pew Research Center, 348, 350
Philippines, 422–423
photographs as too positive, 210
pink slime, 262
planning, risk communication
  Citizens Juries®, 300–301
  emergencies, 409–436

planning, risk communication (*Continued*)
  insufficient information for, 52–53
  international efforts, 463–466
  limitations, 95
  methods for, 173–184
  news media, 158–159
  principles of, 89–105
  stakeholder participation, 286–290
podcasts, 358**t**, 360–361
political groups and audience analysis, 128
posters, 197–198
Powell, Douglas, 136
power outage, 427–429
PowerPoint slides, 234
precautionary principle, 462
presentations, 251–254
Presidential/Congressional Commission on Risk Assessment and Risk Management, 101, 222, 286
Presidential Orders, 34
press conference, emergencies, 445
press kits, 271
pretesting messages
  definition of, 91
  in materials, 193–194
  narrative style, 193
  public health campaigns, 474
  schedule for, 91
  technology-assisted communication, 316
  visuals, 209–212, 229
primary audience, 79, *see also* audience
primary group, 79
principled negotiation, 303
principles, risk communication, 89–105
privacy, 325
Privacy Rule, 81
PR Newswire, 275–276
probability, 218–223
probability plus uncertainty, 224–226
process, risk communication, 6
professional journals, 199
Profnet, 276
PROMed, 327
proof, opinions on, 61–62
public affairs, 52, 77, 245
public health campaigns, 277–278, 471–487
public health campaigns, overcoming barriers to success, 479–481
Public Health Preparedness funding, 42
public involvement, 72**t**
public service announcements, 277–278
purpose and risk communication, 3, 109–115

Q&A, 291–292
question approach to designing visuals, 207–208
questions and answers, 291–292

race and environmental equity, 34, 74–75
racist language, 193
radiation, 213, 214, 214*f*, 217*f*, 256
radio, 429
radon, 20, 59, 143, 217**t**
ranges, 217*f*
  and communicating risk, 102
readability formulas, 193
reading level and technical reports, 199–200
Ready.gov, 435
Record of Decision, 36
recording comments at formal hearings, 291
Reduce Environmental Health and Safety Risks to Children (Executive Order 13045), 34
Regan, Michael, 395
regulations, 30–34, 36
regulatory negotiation, 305
rehearsals, 248, 251
related information sections, 191
relational dialectics approach, 25
relative risk, 271–272
  vs. absolute risk, 234–235, 235*f*
representation, legitimacy of, 77–78
representatives, risk communicating organization, 77–78, 159, 242, 247–249
reputation management, 351
research, formative, 473–474
Resource Conservation and Recovery Act (RCRA), 39

resources
  audience analysis, 121
  communication plan, 177
  emergencies, 430
  inadequate for risk communication, 46–47
  mass media interactions, 159
  news media interactions, 443
  stakeholder participation, 160
respect for cultural sensitivities, 461
Restoration Advisory Boards, 296
reverse 911 systems, 338, 426–427
review procedures
  constraints caused by, 50–51, 92–93
  emergencies, 430
  ethical issues, 79–81
  mass media, 159, 264–265, 268
  schedules, 168
  social media, 356
  partnerships, 377
Reye's syndrome, 476
risk assessment
  comparisons between, 102
  mistrust of, 60–61
  Natural Resource Damage Assessment, 36–37
  risk communication process, 6, 13
  stakeholder participation, 298–299, 308**t**
risk/benefit analysis, 6, 137
Risk Communication Advisory Committee, 137
risk communication methods, 130**t**, 153–166, 474–479
risk communication plans, community relations plans, 31, 32*f*–33*f*, 127
risk communication plans, developing, 173–184, 429–432
risk idiom, 72–74
risk information seeking and processing approach, 22–23
risk ladders, 230–232, 231*f*
risk management, 189, 305–307, 308**t**
Risk Management Plan Rule, 39, 51–52
risk visibility, 112
roadmap (visual representation of risk), 216, 216*f*
Rogers, Everett, 23
roles dichotomy, 49–50
Rowan, Katherine, 16
rulemaking, negotiated, 305
Russell, Cristine, 271
Russia, 460, 462
Rutgers University, 48, 390

SAFECAST, 424
Safety Data Sheets (SDS), 38–39, 322
Sandman, Peter M., 14, 46, 182, 405, 406
Santos, Susan, 98, 390
satellite broadcasts, 325–326
Satterfield, Theresa, 63, 76
schedules
  communication plan, 177
  establishing, 167–172
  group interactions, 292
  insufficient information to plan, 52–53
  mass media, 158, 264–265, 272–273, 443
  tours and demonstrations, 250–251
Scheiber, H. J., 209
scientific notation, 192
scientific process and schedules, 169
SciLands Virtual Continent, 341–342
Second Life®, 339–342, 340*f*, 341*f*
self-help groups, 293–294, 307–308**t**
Sellnow, Timothy, 25
settings
  group interactions, 290–291
  interviews, 31, 254
  speaking engagements, 248
  video presentations, 252
severe acute respiratory syndrome (SARS), 408, 418
sexist language, 193
Shannon, Claude, 12
shared databases, 321–322
sign language, 250
signoff page, communication plan, 177
silicone breast implants, 85
Site-Specific Advisory Boards, 296
SITREP, 442
Situation Reports, 442
skin cancer, 475
Skype, 421

Slovic, Paul, 14, 18
smallpox, 145**t**
Smart Book, 441–442
Smart Comment, 334
smoking cessation, 213, 215*f*
SOCHO, 147
social amplification of risk approach, 14–15
social constructionist approach, 15–16
social ethics, 70–72
social groups, 418
social marketing, 471
social media
  campaign, failure, 364
  and crowdsourcing, 422–426
  evaluation, 390
  methods, 163–164, 277, 347–369, 430, 476–477
  metrics, 362–363
  in public health campaigns, 476–477
  use of, 348–349
social network contagion approach, 17–18
social networking sites, 359
social trust, 19
  approach, 18–19
Society for Technical Communication, 69
sociologists, 127
sociopolitical environment, 70–72
software, databases, 321–322
Sokler, Linda, 399
solid waste and RCRA, 39
space shuttles, 85, 234
speakers bureaus, 249–250
speaking engagements, 247–249
spokespersons
  credibility, 250–251, 409
  emergencies, 430, 445
  legitimacy, 77–78
  mass media, 159
  selection of, 78**t**, 242
  skills required, 159
  training, 247–248
  video presentations, 252
sponsorships, 374
stakeholder participation
  advantages and disadvantages, 73**t**, 307–308**t**
  advertisements for, 31
  CERCLA, 31, 32*f*–33*f*, 179
  communication method, 160–161, 161*f*
  conducting, 285–313
  emergency planning and response, 418–420
  evaluating risk communication efforts, 390–391
  vs. face-to-face communication, 156, 242
  when to use, 161
stakeholders
  communication approaches to, 11–26, 180–182
  comparisons in communication products, 100–104
  confusion, 75
  constraints, 56–58
  emotions, 12, 14, 56–58, 289
  evaluating risk communication efforts, 392**t**
  expectations from, 247, 289, 430, 431**t**
  internal management as, 47–49, 79, 177
  news media as, 262
  patronizing approach to, 53–54, 96, 250–251
  perceptions, 94
  science-phobic attitude assumed by, 54–55
  use of the word, 193
  values, 61
Standard Unified Modeling, Mapping, and Integration Toolkit, 339
standards, comparisons to, 102, 210
Stanford University, 474
state emergency response commissions, 31–34
State Environmental Policy Act, 30
stigma, 14–15, 63–64, 76
stories, value of, 461
storyboarding, 177–178
strategic planning, 182–183
streaming video, 325

structure
  group interactions, 291
  information materials, 191, 199
  stakeholder participation, 306
study circles, 301
Study Circles Resource Center, 301
SUMMIT, 339
Superfund Amendment and Reauthorization Act (SARA), 30–31
surrogate audiences, 126
surveys, 254, 394–395, 473
survivors and post-emergency, communication, 448–451
symbols, 227

Tal, Alon, 60
task forces, 372–373
technical advisors, 298
technical assistance, 296, 306–307
technical communication, 3
technical reports, 199–200
technical writers, 154
technology-assisted communication
  advantages and disadvantages, 162–163
  choosing and using applications, 315–345, 420–421
  databases, 321–322
  decision tools, 235–236, 298–299
  media delivery, 275–276
  unavailable, 434
technology failures, 338
Technorati.com, 357
teen pregnancy, 475
telebriefings, 278–279, 325–326
telecommunications, 426–427
text alerts, 337, 338, 426
Threat Rigidity Response, 48
timelines and context, 210, 212, 212*f*
Toastmasters International, 242, 248
tobacco warnings, 463
tools, emergency planning, 339–342
tours, 250–251
Tox Town, 342
tracking comments and responses, 333–334
traditional approach to risk communication, 12
training, 78**t**, 317–320, 339–342, 378
  computer-based, 317–320
  emergency response, 415–418
  evaluators, 392–393
  face-to-face communication, 255–156
  risk management, 306–307
  spokespersons, 78**t**, 247–248, 249, 269–270
  stakeholders, 299–300
translating to native language, 409
transparency in emergencies, 440
Treatment Decision Tools, 322–323
trivializing risk, 101
trust, 18, 407–409
  diversity, 409
Tufte, Edward R., 204, 205, 234
Tufts University, 390
tweeting, 360
Tylenol tampering, 62
Typhoon Yolanda, 422

uncertainty, 98–99, 189, 223–224
underspecificity, 62
UNICEF, 377
unintentional bias, 234
union conflicts, 307
United Nations Economic Commission for Europe, 227
University of California-Berkeley, 267, 476, 484
University of Maryland, 49, 389
University of Melbourne, 62
University of Michigan, 329–330
University of Rochester, 213
University of Toronto, 145
University of Wisconsin-Madison, 22
Ury, William, 303
usability testing, 323–324, 331, 474
U.S. Army, 348
U.S. Army Medical Command, 371
U.S. Centers for Disease Control and Prevention, 24, 25, 323, 372, 406
  anthrax, 409
  crisis communication, 138
  emergencies, 42, 435, 438–439, 444–445

U.S. Centers for Disease Control and Prevention (*Continued*)
  guidance, 110
  online communication, 326
  visuals, 226
  volunteers during emergencies, 418
U.S. Department of Defense, 296
U.S. Department of Energy, 91, 110, 296, 335
U.S. Department of Health and Human Services, 39, 435
U.S. Department of Homeland Security, 416
U.S. Environmental Protection Agency, 121, 193, 213, 269, 330–331, 395–396, 432
U.S. Environmental Protection Agency, radon, 20, 474
U.S. Food and Drug Administration, 137
U.S. Institute for Environmental Conflict Resolution, 305
U.S. Occupational Safety and Health Administration, 227
U.S. Office of Management and Budget, 119, 394

vaccinations, 479
vagueness, 62
Valdez, Armando, 329
values, 14, 23, 61
verb choice, information materials, 192
verification of information in emergencies, 430
vicarious rehearsal, 437
victims, 448–450
  and language, 192
video image and file-sharing sites, 361–362
video news releases, 276
video presentations, 251–254
virtual reality, 339–342
visibility, risk, 112
vision, 275–276
visual representations of risk
  definition of, 155
  ethical issues, 232–235
  Executive Order 12898, 34
  face-to-face communication, 246
  formats for risk information, 208**t**
  group decision-making, 235–236
  media coverage, 270
  multimedia approaches, 251–254
  preparing, 203–240
  speakers bureaus, 249
  standard *vs.* risk, 210
  studies on, 203–204
  uncertainty of risk, 223–224
visuals in various media, 206–207**t**
Voice-Over-Internet-Protocol, 421
volcanoes, 462. *See also* emergency communication
volunteer support during an emergency, 418–420
vulnerable populations, 433–436

Waddell, Craig, 16
Wallace-Wells, David, 266
Wallack, Lawrence, 203, 267, 476, 484
warning labels, 227–230, 463
Washington Post, 266, 271–272
web broadcasts, 325–326
websites
  consensus communication, 332–336
  emergency communications, 420–421
  indirect audience analysis, 127
  intranets, 321–322
  media resources, 275
  virtual reality, 339–342
Wego Health, 379
West Nile virus, 93, 409, 446
Western Washington University, 194
wheelchair access, 250
whistleblower, 85
widgets, 323
WiFi hot spots, 338–339
Wilson, Thomas, 185
wireless alerts for crisis communication, 337
wireless emergency alerts, 149
Witte, Kim, 144
workers, *see* employees
working with influencers, 378–381

workshops, 295
World Health Organization, 377, 406–407, 464, 473–474
world-wide use of social media, 349
worst-case scenario, 39
writing
  acronyms and abbreviations, 190, 196
  blogs, 356
  comprehension, 75–76, 154
  concept loading, 131
  e-mail, 320–321
  health communication, 144–147
  incorporating audience analysis, 129–131
  news media, 265–266
  scientific notation and formulas, 101, 192
  social media, 354–355
  style, 192
  video presentations, 252

Zedlewski, Edwin, 388–389
Zika, lessons learned, 406
zombie apocalypse campaign, 483–484

WILEY END USER LICENSE AGREEMENT

Go to www.wiley.com/go/eula to access Wiley's ebook EULA.